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THE
JOURNAL OF MALACOLOGY.

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CORRIGENDA.

(See also page 129.)

- p. 37, line 34, for it apparently altogether disappears *read*
they apparently altogether disappear.
- p. 40, line 35, right hand column, for stomach *read* siphon.
- p. 42, line 35, insert comma after *E. siliqua*, and delete the word and
before, and the comma after, *Cultellus pellucidus*.
- p. 82, line 26, for protuding *read* protruding.
- p. 102, line 17, for more conspicuous *read* less conspicuous.

THE
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No. 1.

MARCH 31st, 1903.

VOL. X.

MALACOLOGICAL NOTES.*

BY E. R. SYKES, B.A., F.L.S.

13.—The Value of the name *Rhodina*, de Morgan.

Recently, ⁽¹⁾ I described and figured a shell from Kelantan, under the name *Rhodina* (?) *mirabilis*. I felt some doubt as to whether the form really belonged to de Morgan's genus, as the single species he referred to it ⁽²⁾ was, and is, unknown to me. Dr. Moellendorff ⁽³⁾ expressed the view that the form did really belong to de Morgan's genus. Whether this be so or not the name *Rhodina* cannot be used in Molluscs, having been employed by Guenée ⁽⁴⁾ in 1854 for an Australian butterfly. Under these circumstances I propose the new genus

***Plicaxis*.**

and take as the type my *Rhodina* (?) *mirabilis*. I feel but little doubt that de Morgan's *R. perakensis* also belongs here.

Dr. Moellendorff suggests that the group should be reduced to a sub-genus of *Prosopæas*, but it appears to me to be distinct from the typical Nicobar forms; it may be remarked, with regard to this last name, that *Prosopæa* and *Prosopæus* had previously been used in Zoology.

* See Vol. viii, p. 109.

¹. Ante, vol. ix, pp. 22, 61.

². Bull. Soc. Zool. France, 1885, vol. x, p. 390.

³. Nachrbl. Deutsch. Malak. Ges., 1902, p. 140

⁴. Hist. Nat. Insectes, Spec. Gen. Lepidoptères, 1854, vol. viii, p. 19.

14.—Description of *Leptachatina henshawi*, n.sp.

Shell ovately-pyramidal, rimate, somewhat thin, brownish-horny in colour, longitudinally well marked with filiform striæ, which become weaker towards the base, apex blunt. Whorls $5\frac{1}{2}$, plano-convex, the protoconch being large and smooth, the others sculptured as mentioned above, the last whorl measuring $\frac{4}{7}$ of the entire length of the shell. Suture well marked. Mouth subquadrate, the straight columellar margin being slightly reflected. Plica small and ascending.

Alt. 7 ; diam. max. 3.6 millim.

Hab.—Bucholtz, Kona, 1,800 feet, Hawaii (comm. H. Henshaw).



This pretty little shell recalls somewhat in appearance *Thaanumia omphalodes*, Ancy, but lacks the sculpture of the protoconch and the distinct umbilical area. The sculpture is similar in nature to that of *L. tenebrosa*, Pease, of Kauai, &c. I know no very close ally in the Hawaiian fauna. It is with much pleasure that I affix to the species the name of Prof. H. Henshaw, to whom I owe both it and many other interesting Hawaiian shells.

15.—On the name *Cataulus*.

In 1847, Gray ⁽¹⁾ mentioned, in the synonymy of *Brachypus*, the name *Tortulosa*, giving *Turbo tortuosus* as a type or example. Three years after ⁽²⁾ the species appears under *Megalomastoma*, the name *Tortulosa* not being mentioned.

In 1851 Pfeiffer ⁽³⁾ proposed and diagnosed *Cataulus* for three species, *tortuosus*, *templemani*, and *layardi*, no type being named, and the following year he extended ⁽⁴⁾ the group by the addition of three more species, a course which he also adopted in the well-known "Monographia Pneumonoporum" (p. 136).

¹. Proc. Zool. Soc., 1847, p. 177.

². Nomencl. Moll. Brit. Mus. Part I, p. 30.

³. Zeitschr. f. malak., vol. viii, p. 149.

⁴. Cat. Phan. Brit. Mus., p. 95.

The brothers Adams ⁽⁵⁾ in March, 1856, used the generic name *Tortulosa* in place of *Cataulus*, giving for the first time a diagnosis of *Tortulosa*.

In 1858 Pfeiffer ⁽⁶⁾ under his genus *Cataulus*, states "Species typicae omnes ex insulâ Ceylon allatae sunt, unica ex insulis Nicobaricis, characteribus aberrantibus praedita, ab illis separari potest," and divides *Cataulus* in the following way :—

- A. Abnormes (*Tortulosa*, sect. *Brachypolis*, Gray
in Proc. Zool. Soc., 1847, p. 177). § 1 Nr. 1.
B. Normales. § 2 Nr. 2-13.

and in his second supplement (p. 87) he states : Sections A. *Tortulosa*, Gray ; B. *Cataulus*, Pfr., a course which he equally follows in his third supplement (p. 140).

In 1897, Dr. Kobelt and Herr von Moellendorff ⁽⁷⁾ used "*Cataulus*, Blanford" for the whole group, and in the following year I carelessly stated that *Turbo tortuosus* might stand as the type.

Last year Dr. Kobelt ⁽⁸⁾ suppressed *Cataulus* altogether on the ground that it was a synonym of *Tortulosa*, and proposed a new sub-genus of *Tortulosa*, which he called *Eucataulus*, with *Cataulus templemani* as the type.

From the foregoing facts and especially considering that no type of *Cataulus* was originally named, and the sub-division of the group by Pfeiffer in the Supplements to the "Mon. Pneum.," I think that the new name is unnecessary, and that even if *Cataulus* and *Tortulosa* be not distinct as genera, still the former may well be used as a section of the latter.

⁵. Gen. Rec. Moll., vol. ii, p. 285.

⁶. Mon. Pneum. Suppl. I, p. 87.

⁷. Nachrbl. Deutsch. Malak. Ges., p. 141.

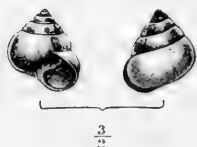
⁸. Das Thierreich, *Cyclophoridae*, p. 281.

SUPPOSED NEW SPECIES OF HELICINA AND BULIMULUS FROM COSTA RICA.

BY H. B. PRESTON, F.Z.S.

Helicina gemma, n.sp.

Shell conical, elevated, bright yellow, apical whorls crimson, last whorl tinged with orange-scarlet for some distance from the mouth, the outer lip being also of a vivid orange-scarlet colour. Whorls 5, convex, very finely striated with lines of growth. Peristome expanded and slightly reflexed. Aperture rather high and narrow. Operculum reddish-brown, normal.



Diam. maj. 6, alt. 7 millim. Aperture (inside measurement) diam. 2.5, alt. 3 millim.

Hab.—Costa Rica.

A very beautiful and striking shell, whose nearest ally appears to be *H. oweniana*, Pfr., from Mexico; from this, however, it differs in being more globular, in the greater convexity of the whorls and in having one less, in the narrower aperture, and in the colouration of the outer lip (otherwise similar in both species) extending further up the body whorl than it does in *H. oweniana*.

Bulimulus (Drymaeus) nubilus, n.sp.

Shell elevated, conic, perforate, pale flesh-colour with a narrow dark purple band extending all round, and at about one millimetre behind, the outer edge of the peristome, also with a few similar, though less marked bands (corresponding to the periodic mouths) upon the spire. Whorls 6-7, irregularly malleated, and striated with lines of growth. Apex blunt. Suture impressed. Umbilicus narrow and partly concealed by the reflexed columella. Peristome slightly reflexed at base. Aperture oval.



Diam. maj. 10.5, alt. 23 millim. Aperture (inside measurement) diam. 5, alt. 9 millim.

Hab.—Azarhar de Cartago, Costa Rica.

A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART V*)

BY G. K. GUDE, F.Z.S.

xii. FURTHER INDIA (NOT INCLUDING BURMA).

This region is very rich in molluscan life, and although many tracts remain to be explored, our knowledge of its fauna is sufficiently advanced to warrant some generalisations. The most salient feature, perhaps, is the appearance of *Amphidromus*, whose headquarters are in the Malay Archipelago, and many of whose species are characterised by great beauty of colour and marking. Other links with the Malaysian fauna are *Chloritis* and *Xesta*. *Neoceporis*, represented by three species, is peculiar to Tonkin. *Ganesella*, which extends to India, Burma, China, and Japan on the one hand, and to the Malay and Philippine Archipelagoes on the other, here produces a number of keeled forms. *Plectopylis* is well represented in Tonkin, producing no less than twenty species, four of which belong to the section *Sinicola*, hitherto believed to be exclusively Chinese. With the exception of *Plectopylis laomontana*, Pfr., found in Laos, the genus is absent in the other divisions of this region. *Hemiplecta* has here gigantic representatives in *H. distincta*, *H. neptunus*, and the beautiful and rare *H. cambojiensis*.

Turning to the history of our knowledge of the region we find that the "Bonite," in 1837, touched at Touran, in Annam, whence Eydoux and Souleyet described a number of species in the Zoological portion of the results of the voyage in 1852. The American missionary, E. House, was the first to procure land shells of undoubted Siamese origin, and these were described by Redfield and Haines.⁽¹⁾ The French traveller Mouhot, who explored Laos and Cambodia, between 1858 and 1860, collected there a number of land shells, which were sent to London, and described by Pfeiffer; some of these were figured in Mouhot's posthumous work published in 1864. Several Siamese shells sent to the British Museum by Sir J. Bowring and Sir R. Schomburgk, were described by Professor von Martens,⁽²⁾ who himself, in 1861, visited Siam with the Prussian Expedition to Eastern Asia, and described his finds in the publication of the expedition.

* See ante. vol. ix, p. 112.

¹. Ann. Lyceum Nat. Hist., New York, 1853-55.

². Proc. Zool. Soc., 1860.

Great impetus to exploration was given by the successive French occupation of Cochin-China, Cambodia, Annam and Tonkin, a number of scientific expeditions traversing the newly-acquired territories. Le Mesle visited Cambodia and Cochin-China, and published his results in conjunction with Mr. Jules Mabilie⁽³⁾. Mr. A. Morelet utilised the materials collected by Vesco, Massin and Silvestre for his Fauna⁽⁴⁾. The shells obtained by Mr. Germain in Cochin-China were described by Mr. T. de Rochebrune.⁽⁵⁾ Mr. L. Morlet dealt with the collections made by Mr. Pavie in Cambodia⁽⁶⁾, in Cambodia and Siam⁽⁷⁾, and by Mr. Jourdy in Tonkin⁽⁸⁾. Mr. de Morlaincourt's collections in Tonkin were published by Mr. Dautzenberg and Baron d'Hamonville⁽⁹⁾, and Capt. Dorr's in Annam by Mr. G. Wattebled⁽¹⁰⁾. Mr. Ancey described the new species acquired in Tonkin by Mr. Villedary⁽¹¹⁾, and those collected by Mr. H. Counillon in Laos⁽¹²⁾, while Mr. Jules Mabilie compiled a treatise on the materials gathered by Mr. Balansa in Tonkin⁽¹³⁾.

More recently, Lieut.-Col. Messenger and Dr. R. Bavay have collected numbers of undescribed shells in Tonkin, and these form the substance of four articles by Messrs. A. Bavay and Dautzenberg.⁽¹⁴⁾ The present writer has dealt with the *Plectopylis* collected by Lieut.-Col. Messenger.⁽¹⁵⁾

Finally Dr. von Möllendorff has made numerous additions to the fauna of this region from material obtained by Mr. Roebelen in Annam⁽¹⁶⁾, and by Mr. Fruhstorfer in Annam and Siam.⁽¹⁷⁾

A. SIAM.

Family **Zonitidae**.

Sub-family **Ariophantinae**.

Genus **EUPLECTA**, Semp.

rosamunda, Bens. Menam Pinh,

E. Laos.

danae, Pfr. Laos.

dichromatica, Morlet. Between
Srakeo and Ong-son.

Genus **XESTINA**, Semp.

granulosa, Mdff. ?Bangkok.

Genus **XESTA**, Alb.

siamensis, Pfr. Pechaburi.

= birmana, Pfr.

v. mouhoti, Pfr.

vallicola, Pfr.

splendens, Hutt.

Sub-family **Macrochlaminae**.

Genus **MACROCHLAMYS**, Bens.

dugasti, Morlet. Menam Pinh,
Laos.

hainesi, Pfr.

resplendens, Phil. Pechaburi,
Bang-Pra.

v. subcornea, Pfr. Menam
Pinh.

v. obesior, Mts. Pechaburi,
Bang-Pra.

pedina, Bens. Between Bangkok
and Chentabun ; between
Pasé and Chentabun.

³. Journ. de Conchyl., 1866.

⁴. Series Conchyl. Livr. IV, 1875.

⁵. Bull. Soc. Philom. Paris, 1881.

⁶. Journ. de Conchyl., 1883, 1884, 1886.

⁷. *Op. cit.*, 1889.

⁸. *Op. cit.*, 1886.

⁹. Journ. de Conchyl., 1887.

¹⁰. *Op. cit.*, 1886.

¹¹. Le Naturaliste, 1888.

¹². Bull. Mus. Marseille, 1898, T. I.

¹³. Bull. Soc. Malac. France, 1887, T. IV.

¹⁴. Journ. de Conchyl., 1899, 1900.

¹⁵. *Op. cit.*, 1901.

¹⁶. Nachr. Deutsch. Malak., Gesell., 1898.

¹⁷. *Op. cit.*, 1900, 1901, 1902.

- ? malaccana, Pfr.
 mitiusecula, Mts.
 sinulabris, Mts. Between Bangkok and Peehaburi.
 benoiti, Crosse and Fisch. Between Bangkok and Chentabun ; Xieng-Moi ; Luang Prabang, Laos.
 callojuncta, Anc. Luang Prabang.
 ochtogyra, Mdff. Bangkok.
 heptagyra, Mdff. Kanburi.
 brunnea, Mdff. Bangkok ; Muoklek ; Hinlap.
- Genus EVERETTIA, G.-A.
 punicata, Morelet. Ayuthia.
 bocourti, Morelet. Battambang.
 dohrniana, Pfr. Mt. Sysophon.
- Genus BENSONIA, Pfr.
 laotica, Mdff. Laos.
- Genus MICROCYSTINA, Morch.
 bourguignatiana, Mab. and Lem. Banone.
- Genus HEMIPLECTA, Alb.
 weinkauffiana, Cr. and F. Vatana ; Mt. Sysophon ; between Battambang and Kompingson.
 crossei, Pfr. Vatana ; Mt. Sysophon.
 dura, Pfr. Laos.
 euterpe, Pfr.
 zimmayensis, G.-A. Zimmé.
 distincta, Pfr. Bangkok ; Siam generally ; Xieng-Moi, Laos.
 = pernobilis, Fér.
 v. neptunus, Pfr.
 v. pluto, Pfr. Laos.
 cambojiensis, Rve.
- Genus DYAKIA, G.-A.
 hugonis, Pfr. Vatana ; between Bangkok and Chentabun.
- Sub-family **Helicarioninae**.
 Genus HELICARION, Fér.
 siamensis, Haines. Bangkok.
 = paviei, Morlet.
 raphiellus, Mts.
 cochinchinensis, Morelet.
- Genus DURGELLA, G.-A.
 siamensis, Mdff. Muoklek.
- Genus KALIELLA, W. T. Blanford.
 mitis, Pfr. Laos.
- Genus SESARA, Alb.
 diplodon, Bens. Laos.
 megalodon, W. T. Blanford. Pit-sunaloke.
 penoti, Anc. Luang Prabang, Laos.
- Sub-family **Zonitinae**.
 Genus VITRINA, Beck.
 cochinchinensis, Morelet. Mt. Kambo.
- Genus TROCHOMORPHA, Alb.
 benigna, Pfr. Laos.
 paviei, Morlet. Luang Prabang, Laos.
- Family **Helicidae**.
 Genus PLECTOPYLIS, Bens.
 Section CHERSAECIA, Gude.
 laomontana, Pfr. Luang Prabang, Laos.
- Group **Epiphalllogona**, Pils.
 Genus CAMAENA, Alb.
 illustris, Pfr. Laos.
 dugasti, Morlet, Laos.
- Genus PLANISPIRA, Beck.
 Sub-genus TRACHIA, Alb.
 gabata, Gld. Menam-Pinh.
- Sub-genus ANGASELLA, A. Ad.
 Section TRACHIOPSIS, Pils.
 siamensis, Mdff. Muoklek ; Kanburi.
 (Chloritis siamensis, Mdff.)
 norodomiana, Morlet. Xieng-Moi, Laos.
- Genus CHLORITIS, Beck.

Sub-genus *TRICHOCHLORITIS*, Pils.*breviseta*, Pfr.*tenella*, Pfr. Between Bangkok and Chentabun. Pnom-san-Krean.*remoratrix*, Morlet. Between Bassac and Siempang, Laos.*deliciosa*, Pfr. Laos.*tanquereyi*, Cr. and F. Banone.*fouresi*, Morlet. Between Bangkok and Chentabun ; Srakeo.Genus *CHALEPOTAXIS*, Anc.*infantilis*, Gredl. Luang Prabang, Laos.Genus *GANESELLA*, W. T. Blauf.*capitum*, Bens. Pnom-san-Krean ; Bangkok.*hariola* v. *carinella*, Mdff. Muoklek ; Kanburi.*perakensis*, Cr. Between Bangkok and Chentabun.*siamensis*, Redf.(*Bulimus siamensis*, Redf.)*rostrella*, Pfr. Luang Prabang, Laos.*hyperteleia*, Morlet. Laos.*ptychostyla*, Mts. Between

Bangkok and Chentabun

Pnom-san-Krean ; Ayu-

thia ; Xieng-Moi, Laos.

= *goniochila*, Pfr.*styloptycta*, Pfr.= *ptychostyla*, Pfr. non Mts.*diplogramme*, Mdff. Bangkok ; Hinlap ; Muoklek.(*Plectotropis diplogramme*, Mdff.).v. *albicans*, Mdff. Kanburi.Genus *AMPHIDROMUS*, Alb.*aureus*, Martyn v. *leucoxantha*, Mts. Between Chentabun and Srakeo.*atricallosus*, Gld. ?*inversus*, Mull. v. *curta*, Morlet.*Battambang*.*comes*, Pfr. Battambang.*kobelti*, Mdff. Hinlap.*glaucolarynx*, Dohrn. Pechaburi.v. *fasciata*, Mts. Pechaburi.v. *albicans*, Mdff.*schomburgki*, Pfr. Srakeo ; Elephant Mountains.v. *legitima*, Mts.v. *crosseii*, Pfr.v. *mouhoti*, Mts.v. *fasciata*, Mts.*laosianus*, Bavay.v. *albocaeruleus*, Bavay.

Khone.

mouhoti, Pfr.*roseolabiatus*, Fult.*sinensis*, Bens.v. *indistincta*, Pils. Laos Mountains.*roemeri*, Pfr. Laos Mountains.*hemicyclus*, Rochebr. Bangkok.*semitessellatus*, Morlet. Srakeo.*xiengensis*, Morlet. Xieng-Moi

Plateau ; Banks of Me-

nam-Pinh ; Luang Pra-

bang ; Prang.

flavus, Pfr. Luang Prabang.*areolatus*, Pfr.*zebrinus*, Pfr.Group *Belogona*, v. Iher.*BELOGONA EUADENIA*, Pils.Genus *EULOTA*, Hartm.*similaris*, Fér. Bang-Pra, etc.*tourannensis*, Eyd. and Soul.= *globula*, Lea.= *bolus*, Bens.= *clusilis*, Val.Genus *CATHAICA*, Mdff.Sub-genus *EUCATHAICA*, Andr.

- brevispira, H. Ad. Between
Chentabun and Srakeo.
Genus PLECTOTROPIS, Mts.
trichotropis, Pfr. Vatana.
winteriana, Pfr. Island Kokram,
Gulf of Siam.
hupensis, Hde. Menam-Pinh.
= orthocheilis, Hde. emma, Pfr. Laos.
caseus, Pfr. Laos.
repanda, Pfr. Laos.
BELOGONA SIPHONADENIA, Pils.
Genus HELICODONTA, Fér.
Sub genus MOELLENDORFFIA, Anc.
horrida, Pfr. Luang Prabang,
Laos.

DOUBTFUL AND SPURIOUS RECORDS.

- Helix dicaela*, Morelet, = *Planorbis dicaelus*, Morelet.
Helix trochiscus, Pfr.—Originally recorded for Siam, but habitat subsequently corrected to Aru Islands.
Nanina basiodon, Morelet.—Mr. Sykes found this to be the same as *Medyla insculpta*, Pfr., a Norfolk Island shell. The Siam habitat is probably based on a change of labels. It is, however, a curious coincidence that Professor von Martens mentions (Ost-Asien, p. 74) that he found in Mousson's collection a shell which the latter received from Bernardi with the habitat Siam. This shell Professor von Martens identifies as ? *Trochomorpha insculpta*, Pfr.

B. COCHIN CHINA.

- Family **Zonitidae**. long ; Fuyen-Moth
Sub-family **Ariophantinae**. dorri, Wattebl.
Genus EUPLECTA, Semp. hueensis, Wattebl.
cochinechinesis, Pfr. Sub-family **Zonitinae**.
Genus XESTA, Alb. Genus TROCHOMORPHA, Alb.
cidaris, Lam. Preck - Scholl saigonensis, Cr. Saigon.
Spiglumi-Breithon. tonkinorum, Mab.
Sub-family **Macrochlaminae**. sapeca, Hde. Tay-ninh.
Genus MACROCHLAMYS, Bens. Family **Helicidae**.
benoiti, Cr. and F. Group **Epiphalllogona**, Pils.
Genus HEMIPLECTA, Alb. Genus CHLORITIS, Beck.
weinkauffiana, Cr. and F. Sub-genus TRICHOCHLORITIS, Pils.
Saigon. rhinocerotica, Hde. Tay-ninh.
distincta, Pfr. Saigon. deliciosa, Pfr.
v. pluto, Pfr. tenella, Pfr. Spiglumi-Breithon.
cambojiensis, Reeve. Brehum. tanquereyi, Cr. and F. Fuyen-Moth.
= mouhoti, Reeve. Genus AMPHIDROMUS, Alb.
Sub-family **Helicarioninae**. atricallosus, Gld.
Genus HELICARION, Fér. (= *Bulimus eques*, Pfr.)
russeolus, Morelet. comes, Pfr. v. polymorpha, Tapp.
unguiculus, Morelet. Saigon ; Prov. Baté.
cochinchinensis, Morelet. cochinchinensis, Pfr.
Genus KALIELLA, W. T. Blauf. billeheusti, Cr. and F. Vinh-

- cambojiensis, Rve. Brelum.
 mouhoti, Pfr. Brelum.
 fultoni, Anc.
 flavus; Pfr. Thu-Dan-Moth ;
 Ving-Long.
 v. proxima, Fult.
 Genus **GANESELLA**, W. T. Blainf.
 galera, Hde. Tay ninh.
 ptychostyla, Mts.
 siamensis, Redf. v. nobilis, Anc.
 Long Xuyen.
 v. obesula, Anc. Saigon.
 Group **Belogona**, v. Iher.
- BELOGONA EUADENIA, Pils.
 Genus **EULOTA**, Hartin.
 similaris, Fer.
 tourannensis, Eyd. and Soul.
 Fuyen-Moth ; Vinh-Long.
 Genus **PLECTOTROPIS**, Mts.
 emma, Pfr. Spiglumi—Brei-
 thon.
 pavici, Morlet.
 DOUBTFUL RECORDS.
 Amphidromus perversus, L.
 ,, sultanus, Lam.
 ,, chloris, Rve.

C. CAMBODIA.

- Family **Zonitidae**.
 Sub-family **Ariophantinae**.
 Genus **EUPLECTA**, Semp.
 hyphasma, Pfr. Kam-Chay.
 Genus **XESTINA**, Semp.
 cardiostoma, Mdff.
 Sub-family **Macrochlaminae**.
 Genus **MACROCHLAMYS**, Bens.
 benoiti, Cr. and F.
 resplendens, Phil. Kebal-Roumias,
 Genus **MICROCYSTINA**, Moreh.
 ramburiana, Mab. and Lem.
 Houdoung ; Domnac-
 Tenong.
 bourguignatiana, Mab. and Lem.
 Phnum-Kretch.
 Genus **HEMIPLECTA**, Alb.
 crossei, Pfr. Pnom-Kebal ;
 Moth - Kasa ; Phnum-
 Kretch.
 weinkauffiana, Cr. and F. Moth-
 Kasa ; Phnum-Kretch.
 distincta, Pfr.
 v. neptunus.
 v. pluto, Pfr.
 Sub-family **Helicarioninae**.
 Genus **HELICARION**, Fér.
 russeola, Mor. Chandoc Moun-
 tains.
- cochinchinensis, Mor. Moth
 Kasa ; Dien ba.
 siamensis, Haines.
 = pavici, Morlet.
 raphiellus, Mts.
 Sub-family **Zonitinae**.
 Genus **TROCHOMORPHA**, Alb.
 saigonensis, Crosse. Vorvong-
 lovea.
 pavici, Morlet. Between Kam-
 pot and Pnom Penh.
- Family **Helicidae**.
 Group **Epiphallogona**, Pils.
 Genus **CAMAENA**, Alb.
 illustris, Pfr. Chandoc Moun-
 tains.
 Genus **PLANISPIRA**, Beck.
 Sub-genus **ANGASELLA**, A. Ad..
 Section **TRACHOPSIS**, Pils.
 norodomiana, Morlet. Kamchay.
 Genus **CHLORITIS**, Beck.
 Sub-genus **TRICHOCHLORITIS**, Pils.
 seriatisetata, Rochebr. Chandoc
 Mountains.
 deliciosa, Pfr. Chandoc Moun-
 tains.
 quinaria, Pfr.
 = guinaria, Pfr.
 fouresi, Morlet. Strang-Trong.

- Genus **AMPHIDROMUS**, Alb.
nigrofilosus, Rochebr.
inversus, Mull. v. *alboblobosa*,
 Morlet. Between Kampot and Pnom-Penh.
 v. *annamitica*, Cr. and F.
 Saigon ; Fuyen-Moth.
comes, Pfr. Kampot ; Com-
 pentra.
cambojiensis, Rve.
glaucolarynx, Dohrn. v. *per-
 rieri*, Rochebr. Prek-
 Scholl.
cruentatus, Mor.
begini, Morlet. Stung-Trang
 Plateau.
semitessellatus, Morlet. Stung-
 Trang ; Kampot ; Ele-
 phant Mountains.
xiengiensis, Morlet v. *multifas-
 ciata* (Fult.), Pils.
 = *contrarius* v. *multifasciata*,
 Fult.
 v. *clausa*, Pils.
 v. *tryoni*, Pils.
 Genus **GANESELLA**, W. T. Blanf.
styloptycta, Pfr. Vorvong-
 lovea ; Moth-Kasa ;
 Phnum-Kretch.
 = *ptychostyla*, Mts.
 Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
 Genus **EULOTA**, Hartm.
cestus, Bens. Moth-Kasa ; Pnom-
 Penh.
frilleyi, Cr. and Deb. Kebal-
 Khmoch.
tourannensis, Soul. Moth-
 Kasa.
pilidion, Bens.
 Genus **PLECTOTROPIS**, Mts.
repanda, Pfr.
caseus, Pfr.
BELOGONA SIPHONADENIA, Pils.
 Genus **HELICODONTA**, Fér.
 Sub-genus **MOELLENDORFFIA**, Anc.
horrida, Pfr.
 DOUETFUL RECORDS.
Amphidromus fureillatus,
 Mouss.
 „ *laevus*, Mull.
 „ *adamsii*, Rve.
 „ *contrarius*,
 Mull.

D. PULO CONDORE.

- Family **Zonitidae**.
 Sub-family **Macrochlaminae**.
 Genus **MICROCYSTINA**, Moreh.
annamitica, Cr. and F.
 Genus **HEMIPLECTA**, Alb.
weinkauffiana, Cr. and F.
crossei, Pfr.
striata, Gray.
 = *naninoides*, Bens.
distincta, Pfr.
 = *pernobilis*, Fér.
 Sub-family **Helicarioninae**.
 Genus **KALIELLA**, W. T. Blanf.
bouyeri, Cr. and F.
 Sub-family **Zonitinae**.
 Genus **TROCHOMORPHA**, Alb.
saigonensis, Crosse.
 Family **Helicidae**.
 Group **Epiphallogona**, Pils.
 Genus **CHLORITIS**, Beek.
 Sub-genus **TRICHOCHLORITIS**, Pils.
condoriana, Cr. and F.
 Genus **AMPHIDROMUS**, Alb.
dohrni, Pfr.
 Genus **GANESELLA**, W. T. Blanf.
siamensis, Redf.
 (*Bulimus siamensis*, Redf.).
 Group **Belogona**, v. Iher.

BELOGONA EUADENIA, Pils.
Genus PLECTOTROPIS, Pfr.
repanda, Pfr.

DOUBTFUL RECORDS.
Amphidromus sultanus, Lam.
Amphidromus chloris, Rve.

E. ANNAM.

- Family **Zonitidae**.
Sub-family **Ariophantinae**.
Genus CONEUPLECTA, Mdff.
annamitica, Mdff. Touran ;
Non-njuk.
globulosa, Mdff. Touran.
Genus XESTINA, Semp.
promiscua, Smith. Prov. Binh-Dinh.
denserugata, Mdff. Mt. Dran ;
Hong-gong.
tenera, Mdff. Ballach.
pharangensis, Mdff. Pharang.
Sub-family **Macrochlaminae**.
Genus MACROCHLAMYS, Bens.
tecta, Soul. Touran ; Boloven.
promiscua, Smith. Binh-Dinh.
Genus BENSONIA,
prionotropis, Mdff. Boloven.
Genus MICROCYSTINA, Mörch.
annamitica, Mdff. Boloven.
v. subrubella, Mdff. Nha-Trang, Is. Baimin.
Genus HEMIPLECTA, Alb.
crossei, Pfr. Boloven.
danae, Pfr. Boloven.
Genus RHYSOTA, Alb.
platytaenia, Mdff. Touran.
pergrandis, Smith. Binh-Dinh.
Sub-family **Helicarioninae**.
Genus KALIELLA, W. T. Blanf.
dorri, Wattebl. Hué.
difficilis, Mdff. Touran.
Family **Helicidae**.
Group **Epiphalllogona**, Pils.
Genus CAMAENA, Alb.
pachychilus, Smith. Binh-Dinh.
suprafusca, Mdff. Boloven.
Genus CAMAENELLA, Pils.
fruhstorferi, Mdff. Touran ;
Non-njuk.
nigricans, Mdff. Phuc-son.
Genus CHLORITIS, Beck.
microtricha, Mdff. Boloven.
diplochone, Mdff. Boloven.
Sub-genus TRICHOCHLORITIS, Pils.
tenella, Pfr. Boloven.
Genus GANESELLA, W. T. Blanf.
siamensis, Redf. Pharang ;
Ballach.
(Bulimus siamensis, Redf.)
v. zonifera, Anc.
v. maxima, Anc.
chondroderma, Mdff. Phuc-son.
(Plectotropis chondroderma,
Mdff.)
Genus AMPHIDROMUS, Alb.
inversus, Müll. v. annamitica,
Cr. and F. Boloven Plateau.
metabletus, Mdff. Mother and
Child Mountain ; Baimin
Island.
v. pachychila, Mdff. Nha-trang.
(and forms flava, alba, tritaeniata, trizona, interrupta, confluens, fusca, Mdff.)
v. insularis, Mdff. Baimin
Island.
ingens, Mdff.
costifer, Smith. Prov. Binh-Dinh.
placostylus, Mdff. Phuc-son.
haematostoma, Mdff. Boloven
Plateau.

- smithi, Fult.
 v. ventrosula, Mdff. Phue-son.
 zebrinus, Pfr. v. eudeli, Anc. Binh-Dinh.
 rhodostylus, Mdff. Pharang.
 v. simplex, Mdff.
 (and forms roseolineata, nigro-lineata, ignea, rhabdota, bipartita, subconfluens, Mdff.)
- Group **Belogona**, v. Iher.
 BELOGONA EUADENIA, Pils.
- Genus EULOTA, Hartm.
 tourannensis, Eyd. and Soul. Touran ; Pha-rang.
 v. robusta, Mdff. Phue-son.
- Genus PUPISOMA, Stol.
 hueense, Wattebl. Hué.
 F. TONKIN.
- Family **Zonitidae**.
 Sub-family **Ariophantinae**.
 Genus CONEUPLECTA, Mdff.
 confinis, Mdff. Than-moi.
 subangulata, Mdff. Than-moi.
 ochthogyra, Mdff. Island Bah Mun.
 globulosa, Mdff. Island Ke-Bao.
 sculptilis, Mdff. Island Ke-Bao.
- Genus XESTINA, Semp.
 tongkinensis, Mdff. Tuyen-Kwan.
- Sub-family **Macrochlaminae**.
 Genus MACROCHLAMYS, Bens.
 tenuigranosa, Dautz. Between Bien-Dong and An-Chau.
 alluaudi, Bav. and Dautz. Bac-Kan ; That-Khé.
 stenogyra, Mdff. Manson Mountains.
 glyptoraphe, Mdff. Manson Mountains.
 euspira, Mdff. Island Bah-Mun.
 declivis, Mdff. Than-moi.
- Genus MICROCYSTINA, Mörch.
 mirmido, Dautz. Haiphong;
 tonkinensis, Mdff. Than-moi.
 leucocystis, Mdff. Than-moi.
 v. angigyra, Mdff. Than-moi.
 mansonensis, Mdff. Manson Mountains.
 ? opaca, Mdff. Island Ke-Bao.
- Genus HEMIPLECTA, Alb.
 weinkauffiana, Cr. Elephant Mountains.
 distincta, Pfr.
 v. funerea, Smith. Vanbu.
 v. pallidior, Smith. Vanbu.
 despecta, Mab.
- Sub-family **Helicarioninae**.
 Genus CRYPTOSOMA, G.-A.
 imperator v. brunnea, Mdff. Island Bah-Mun.
 maleficus, Mab.
 fragile, Mdff. Manson Mountains.
- Genus HELICARION, Fér.
 roudouyi, Fisch. Yen-Bai ; Quang-Uyen.
 tongkinensis, Mdff. Than-moi.
 siamensis, Haines. Vanbu.
 = paviei, Morlet.
- Genus SITALA, H. Ad.
 striolata, Mdff. Lang-son.
- Genus KALIELLA, W. T. Blauf.
 regularis, Mdff. Lang-son.
 dolichoconus, Mdff. Than-moi.
 tongkinensis, Mdff. Than-moi.
 gradata, Mdff. Than-moi.
- Sub-family **Zonitinae**.
 Genus TROCHOMORPHA, Alb.
 bicolor, Mts. Halong Bay.
 subtricolor, Mab.
 tonkinorum, Mab.
 montana, Mdff. Long - ma : Mauson Mountains.
 OF UNCERTAIN AFFINITY.

- Ariophanta vernacula*, Mab.
 Near Aurea Mountains
 ,, *excepta*, Mab.
 ,, *infima*, Mab.
 ,, *zero*, Mab.
- Family **Helicidae**.
 Genus **PLECTOPYLIS**, Bens.
 Section **CHERSAECIA**, Gude.
 laomontana, Pfr. Cho-bo.
- Section **ENDOPLON**, Gude.
 anceyi, Gude. Bac-Kan ; Nac-
 Ri ; between Cho-moi and
 That-Khé.
 giardi, H. Fisch. Cao-Bang.
 bavayi, Gude. That-Khé ; Nac-
 Ri.
 persimilis, Gude. That-Khé.
 lepida, Gude. Tinh-Tue.
 congesta, Gude. Bac-Kan ; Nac-
 Ri ; That-Khé.
 françoisi, H. Fisch. Deo-ma-
 Phuc.
 dautzenbergi, Gude. That-Khé ;
 between Cho-moi ; be-
 tween Bac-Kan and Nac-
 Ri.
 pilsbryana, Gude. Islets in
 Halong Bay.
 = *villedaryi*, Pils. and Gude
 non Ancey.
 schlumbergeri, Morlet. Nuy-
 Dong-Nay ; Halong
 Bay ; Elephant Moun-
 tains.
 villedaryi, Anc. Lang-son ; Bach-
 Ninh ; Than-moi.
 = *choanomphala*, Mdff.
 jovia, Mab. Halong.
 moellendorffi, Gude. Than-moi.
 phlyaria, Mab.
 hirsuta, Mdff. Island Bah-Mun.
- Section **SINICOLA**, Gude.
 tenuis, Gude. Cho-Ra ; Bac-
 Kan ; Cho-moi.
- fruhstorferi*, Mdff.
 fischeri, Gude. Bac-Kan.
 emigrans, Mdff. Manson Moun-
 tains ; Bac-Kan ; Nac-
 Ra ; Halong Bay.
- Group **Epiphallogona**, Pils.
 Genus **CAMAENA**, Alb.
 cicatricosa, Müll. Lang-son.
 v. *inflata*, Mdff. Between
 Lang-son and Than-moi.
 v. *obtecta*, Fisch. Luc-Khu ;
 Cao-Bang.
 longsonensis, Morlet. Long-son.
 jaculata, Mab.
 hahni, Mab. Nuy-Dong-Nay.
 = *broti*, Dautz. and D'Ham.
 subgibbera, Mdff. Between
 Lang-son and Than-moi.
 gabriellae, Dautz. and D'Ham,
 Between Bac-ninh and
 Lang-son.
 = *bathmophora*, Mab.
 = *bathymorpha*, Pils.
 v. *subhainanensis*, Pils.
 hainanensis, H. Ad. Halong
 Bay ; Elephant Moun-
 tains.
 xanthoderma, Mdff.
 v. *ingens*, Mdff. Manson
 Mountains.
 illustris, Pfr.
 v. *tonkinensis*, Smith.
 vanbuensis, Smith.
 billeti, H. Fisch. Coa-Bang.
 lavezzarii, Bav. and Dautz.
 Bac-Kan ; That-Khé.
 vorvonga, Bav. and Dautz. Phi-
 mi ; Bac-Kan ; That-
 Khé.
 fauveli, Bav. and Dautz. Pih-
 mi ; Bac-Kan.
- Genus **NEOCEPOLIS**, Pils.

- merarcha, Mab.
 mercatorina, Mab. Between
 Lang-son and Than-moi.
 = morleti, Dautz. and D^r-
 Hamon.
 langsonensis, Bav. and Dautz.
 Between Lang-son and
 That-Khé.
 Genus PLANISPIRA, Beck.
 Sub-genus ANGASELLA, A. Ad.
 Section TRACHIOPSIS, Pils.
 lambineti, Bav. and Dautz.
 Bac-Kan ; That-Khé.
 Genus CHLORITIS, Beck.
 marimberti, Bav. and Dautz.
 Cho-Ra.
 durandi, Bav. and Dautz. Bac-
 Kan.
 gereti, Bav. and Dautz. Bac-
 Kan ; Phi-mi.
 athrix, Mdff. Manson Moun-
 tains.
 insularis, Mdff. Isle des Mer-
 veilles.
 Sub-genus TRICHOCILLORITIS, Pils.
 miara, Mab.
 lemeslei, Morlet. Song-ma.
 balansai, Morlet. Nuy-Dong-
 Nay ; Song-ma ; Lang-
 son ; Halong Bay ; Ele-
 phant Mountains.
 Genus AMPHIDROMUS, Alb.
 dautzenbergi, Fult.
 Genus CHALEPOTAXIS, Anc.
 infantilis, Gredl. Haiphong ;
 Deo-ma-phuc.
 = Xesta unilineata, Dautz.
 = Kaliella haiphongensis,
 Dautz.
 Genus GANESELLA, W. T. Blanf.
 perakensis, Crosse. Halong
 Bay ; Elephant Moun-
 tains.
 v. subperakensis, Pils.
 phonica, Mab.
 procera, Gude. Than-moi.
 eximia, Mdff. Manson Moun-
 tains.
 concavospira, Mdff. Than-moi.
 onestera, Mab.
 rostellra, var. Vanbu.
 straminea, Mdff. Than-moi.
 oxytropis, Mdff. Island Ke-
 Bao.
 platyconus, Mdff.
 pulchella, Mdff. Manson Moun-
 tains.
 vatheleti, Bav. and Dautz. Ha-
 long Bay.
 saurivonga, Bav. and Dautz.
 Bac-Kan ; That-Khé.
 v. concolor, B. and D.
 coudeini, Bav. and Dautz. Bac-
 Kan.
 Group **BELOGONA**, v. Iher.
 BELOGONA EUADENIA, Pils.
 Genus EULOTA, Hartm.
 jourdyi, Morlet. Than-moi ;
 Lang-son ; Dang-son ;
 Chu.
 = vorticellina, Hde.
 v. monticola, Mdff. Manson
 Mountains.
 mabillei, Crosse. Chu.
 vighali, Bav. and Dautz. That-
 Khe.
 Genus EUHADRA, Pils.
 massiei, Morlet. Song-ma.
 pseudopapuina, Mdff. Manson
 Mountains.
 Genus PLECTOTROPIS, Mts.
 bonnierii, H. Fisch. Deo-ma-
 phuc.
 Genus AEGISTA, Alb.
 mensalis, Hde. Song-ma.
 BELOGONA SIPHONADENIA, Pils.
 Genus MOELLENDORFFIA, Anc.
 loxotata, Mab.

spurea, Bav. and Dautz. Bac-	SPECIES OF UNCERTAIN AFFINITY.
Kan.	<i>Helix chytrophora</i> , Mab.
v. deflexa, Mdff. Manson	„ <i>struposa</i> , Mab.
Mountains.	„ <i>tenellula</i> , Mab.
messengeri, Bav. and Dautz.	„ <i>amphicora</i> , Mab.
Between Lang-son and	„ <i>clopica</i> , Mab.
That-Khe.	„ <i>melanotrica</i> , Mab.
callitricha, Bav. and Dautz.	„ <i>dectica</i> , Mab.
That-Khe.	„ <i>baphica</i> , Mab.

ON SOME SPECIES OF SLUGS COLLECTED BY MR. H. FRUHSTORFER.

By WALTER E. COLLINGE, B.Sc.

(Plate i.)

In the latter part of 1901¹⁾, I described a series of slugs collected by Mr. H. Fruhstorfer, of Berlin. One genus belonging to this collection has already been dealt with in detail²⁾, viz., *Myotesta*, and there yet remain two species of *Philomycus*, one of *Microparmarion* and two of *Veronicella*.

Just as the work upon the above mentioned species had been completed, I received from Dr. Simroth, a copy of the note, published in the *Zoologischen Anzeiger*³⁾, and from it I gather that Mr. Fruhstorfer after inviting me to describe the collection and sending me all (?) the examples, has made a similar request to Dr. Simroth, a proceeding, to say the least, unfair and most reprehensible.

As Dr. Simroth has in preparation a work upon the genus *Philomycus* which includes the two species above mentioned, I have thought it only fair to at present withhold my description of the anatomy, but as the figures of the externals were already drawn, I publish those only. I have written Dr. Simroth to this effect.

***Microparmarion bruneopallescens*, Collge.**

Pl. i, figs. 1, 2.

Microparmarion bruneopallescens, Collge.: *Journ. of Malac.*, 1901, vol. viii, p. 120.

Hab.—Annam (H. Fruhstorfer).

***Philomycus fruhstorferi*, Collge.**

Pl. i, figs. 3, 4.

Philomycus fruhstorferi, Collge.: *Journ. of Malac.*, 1901, vol. viii, p. 119.

¹⁾ *Journ. Malac.*, 1901, vol. viii, p. 118-121.

²⁾ *Op. cit.*, 1902, vol. ix, p. 11-16, pl. 1.

³⁾ *Zool. Anz.*, 1902, Bd. xxv, p. 355-357.

Hab.—Nagasaki, Japan (H. Fruhstorfer).

A figure of the animal is now given, also one of the anterior portion of the foot-sole.

Philomycus dendriticus, Cllge.

Pl. i, figs. 5, 6.

Philomycus dendriticus, Cllge. : Journ. of Malac., 1901, vol. viii, p. 119.

Hab.—Mt. Maussion, 2-3000 ft., Tonkin (H. Fruhstorfer).

Veronicella fruhstorferi, Cllge.

Pl. i, figs. 7, 8.

Veronicella fruhstorferi, Cllge. : Journ. of Malac., 1901, vol. viii, p. 120.

Hab.—Mt. Maussion, 2-3000 ft., Tonkin (H. Fruhstorfer).

Veronicella himerta, Cllge.

Pl. i, figs. 9, 10.

Veronicella himerta, Cllge. : Journ. of Malac., 1901, vol. viii, p. 120.

Hab.—Mt. Maussion, 2-3000 ft., Tonkin (H. Fruhstorfer).

EXPLANATION OF PLATE I.

Fig. 1.	<i>Microparmarion brunneopallenscens</i> , Cllge.	Right lateral view. × 2.
Fig. 2.	" " "	Dorsal view. × 2.
Fig. 3.	<i>Philomycus fruhstorferi</i> , Cllge.	Right lateral view. × 1.
Fig. 4.	" " "	Portion of anterior region of foot-sole.
Fig. 5.	<i>Philomycus dendriticus</i> , Cllge.	Right lateral view. × 1.
Fig. 6.	" " "	Dorsal view. × 1.
Fig. 7.	<i>Veronicella fruhstorferi</i> , Cllge.	Dorsal view. × 1.
Fig. 8.	" " "	Ventral view.
Fig. 9.	<i>Veronicella himerta</i> , Cllge.	Dorsal view. × 1.
Fig. 10.	" " "	Ventral view. × 1.

NOTES ON SLUGS AND SLUG-LIKE MOLLUSCS.

By WALTER E. COLLINGE, B.Sc.

1.—On the *Limax umbrosus* of Philippi.

Through the kindness of Dr. Ad. S. Jensen, I have recently had an opportunity of examining a specimen of a slug in the Zoological Museum of the University of Copenhagen, described by Philippi in 1841⁽¹⁾ under the name of *Limax umbrosus*.

Considerable doubt has existed in the minds of malacologists as to the generic and specific identity of this mollusc. Lessona and Pollonera, in their well-known work on the Italian slugs⁽²⁾, classed it as a synonym of *Limax flavus*, L., whilst others have regarded it as a variety of that species.

¹. Enum. Moll. Siciliæ, 1841, ii, p. 102.

². Monog. dei Limacidi Ital., 1882, p. 43.

The specimen I have examined has a label attached bearing the following particulars: "*Limax (Milax) umbrosus*, Phil. Sicilien.—H. F."

It was at once evident on first examination that this specimen was very distinct from *L. flavus*, and on dissecting it I had no hesitation in referring it to the genus *Amalia*, Moq., as evidently was the opinion of "H. F.," the writer of the label. I would further point out the very peculiar foot-sole which this species has, viz., two narrow lateral planes marked with fine transverse lines, and two median planes, separated by a zig-zag line thus VVVV, and differing from that of any other species of *Amalia* with which I am acquainted.

2.—On a species of *Arion* from New Zealand.

Towards the end of 1899, Mr. Henry Suter forwarded to me a small collection of slugs from New Zealand, consisting chiefly of specimens of the common species of *Limax*, *Agriolimax*, and *Amalia*, and a single example of a species of *Arion* from Auckland. So far as I am aware *Arion fuscus*, O. F. Müll., is the only member of this genus which has been found in New Zealand, and in spite of careful inquiry, I have as yet been unable to refer the Auckland specimen to any known species. From the external features I should say that it belongs to the *subfuscus* group, although the mantle is small. The specimen (in alcohol) measures 13.5 millim. in length, and is of a uniform light chocolate-brown colour; foot-sole slightly lighter in colour and smooth.

3.—On the dispersal of *Microparmarion*, sp.

I have recently received from Mr. Arthur E. Shipley, three examples of a new species of *Microparmarion*, which were sent to him from Kew, having been received there in some plants forwarded by Mr. R. Shelford, of Sarawak, N.W. Borneo.

In addition to affording a good example of the artificial distribution of such animals, these particular slugs offer a further point of interest. On teasing out the contents of the stomach of a specimen which had been cut open, I found numerous bits of vegetable tissue, hyphae and spores of fungi, bits of chitin and many chitinous hairs, and finally, an almost perfect specimen of an ant. The latter, I sent to Mr. W. F. Kirby, of the British Museum, who very kindly asked Col. C. T. Bingham to identify it for me, and he writes that it is a specimen of *Cremastogaster miri*, Forel, and that it is common in Borneo.

The numerous hairs and bits of chitin in the stomach would lead one to suppose, that these insects form a considerable item in the food of this particular species. Whether they are eaten dead or alive, I cannot say.

I had previously received examples of this slug from Mr. Shelford, which I hope to describe in detail later.

4.—Variations in the Foot-fringe of *Arion empiricorum*.

For some years I have made careful notes upon the variations in the colour of the foot-fringe of our common *Arion*. The observations have extended over nearly five years, during which time many hundreds of specimens have been examined, with the result that 228 specimens out of just over 1,000 have been noted to possess variously coloured foot-fringes. The percentages of these is rather interesting.

Of the white there were 12, grey 14, fawn 10, light brown 13, chocolate-brown 16, steel-blue 10, greyish-violet 5, pale yellow 29, deep yellow 56, brick-red 7, salmon-pink 6, orange-red 42, sepia 8. In fourteen of these specimens, there were no lineoles.

Excepting fourteen, all the 228 specimens differed from the type, *i.e.*, were colour variations, and ten were albinos.

A few attempts were made to keep some of the most brilliantly coloured varieties under observation, and it was noticed that those specimens with yellow, light brown, or fawn-coloured foot-fringes, soon underwent a change, whilst all the red coloured ones seemed much more permanent.

NOTES.

The Molluscan Fauna of Warwickshire.—The council of the Midland Malacological Society have in preparation a Fauna of the Mollusca of Warwickshire in which it is proposed to give all possible information on the species occurring in the County, *viz.* :—Localities, Food Habits, General Distribution, Geological Formation of District, and other interesting details. They will be pleased to receive the co-operation of all interested, so that the work may not only be a list, but complete, and a valuable one of reference.

In submitting Molluscs, Shells, etc., or information respecting them, workers are requested to give as full details as possible as to :—

1. Locality. 2. Date when collected or observed. 3. Name of the plant on which feeding or where resting. 4. Whether the animal gives off any particular odour. 5. Position, aspect, and general features of locality, *viz.* :—marsh, wood, ditch, etc., etc. 6. Geological formation of ground. 7. General distribution. 8. Whether plentiful. 9. Other particulars, such as size, colour, texture, preponderance of any special form, or other points of interest. Due recognition will be accorded to all such observation.

It is proposed to issue from time to time a summary as to how the work is progressing, which will be duly forwarded to all who have contributed.—
H. OVERTON, Clifton Road, Sutton Coldfield.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xv. (pt. 58), pp. 49-128, pls. 16-34. Philadelphia : Academy of Natural Sciences.

Continuing the genus *Coelocentrum*, a further new species, *C. exlex*, is described and figured. The genus *Holospira*, Marts., is next dealt with. Dr. Pilsbry remarks that these snails are capable of enduring great heat. Living examples of *H. strebeliana* and *H. nelsoni* survived immersion in actually boiling water for some minutes, and, unlike other snails, they did not retract in the water. Some account of the anatomy of the genus is given and illustrated. The kidney is long and narrow, being slightly longer than the pericardium. Apparently there is no secondary ureter. The generative organs are characterised by the short penis, long vas deferens, the great length of the oviduct and (in *H. nelsoni*) the receptacular duct also and the absence of accessory organs. The free retractor muscles are excessively long, attached proximally to the axis at about the junction of the cone with the cylindrical portion of the shell. The following species are new : *H. tetrelasmus* (Mexico) ; *H. nelsoni* (Sierra Guadalupe, Mexico), a species resembling *H. teres*, Mke. ; *H. dalli*, from the same locality, is an extraordinary species, in which the internal column is wider than in any other known form of the genus, and *H. strebeliana*, a species chiefly remarkable for its long, cylindrical, many-whorled shell, very blunt at the ends.

Passing next to the *Urocoptinae*, a short summary of the leading anatomical features of the genus *Urocoptis*, Beck, is given, while the following species, etc., are new : *U. lata*, C.B.Ad., var. *antonionis*, var. *manchioneu-lensis*, subsp. *ichnostele* ; *U. ovata*, Deshayes, var. *sanctaeannae*, and *U. hendersoni*.

A word of praise must be given to the illustrations, which are certainly above the average.

Ortmann, A. E.—Reports of the Princeton University Expeditions to Patagonia, 1896-1899 ; vol. iv, Paleontology—Part II. Tertiary Invertebrates. 1902, pp. 45-332, pls. xi-xxxiv.

To most readers the associations of the name of J. Pierpont Morgan lie "in the steamship in the railway, in the thoughts that shake mankind," rather "than in the march of mind." We remark with pleasure and gratitude the notification on the title-page of the bulky volume before us that this millionaire defrayed all charges.

Dr. Ortmann's report is framed on broad lines. Instead of the usual list of species collected and diagnoses of novelties, we have received a complete monograph of the subject. The history of the Tertiary mollusca of South America commenced with Darwin's visit in the "Beagle," and concludes with Hatcher's investigations. From the Patagonian beds are enumerated 132 molluscs and brachiopods. All the species, new and old, are described

and illustrated, giving the memoir especial value as a work of reference. The fauna as a whole is discussed with the same thoroughness and the species in detail. An analysis of the data collected leads Dr. Ortmann and Mr. Hatcher to dispute many of the conclusions arrived by Ameghino and von Ihering.

The fauna dealt with is regarded as homogeneous, from shallow water, of Miocene date and Antarctic origin. A comparison of such with similar beds in another hemisphere may be expected to be fruitful of results. The conclusion here adopted is that in late Mesozoic or early Tertiary times, Antarctica enjoyed a milder climate than at present, and extended north to America, New Zealand, Australia, and perhaps Africa. Through the warm and shallow seas that washed the Antarctic Continent, or Archipelago, a fauna ranged from Tasmania to Patagonia.

The Antarctic molluscan fauna entombed at Muddy Creek is the richest, according to the late Professor Tate, known to Palæontology. In comparison with it, the Patagonian fauna is a scanty one. We anticipate that the South American deposits are not yet exhausted. Mr. Hatcher's collection mainly consists of large conspicuous shells, and in all probability, the usual complement of small species, measured by millimetres rather than by inches, yet remain to be discovered.—C. HEDLEY.

Jameson, H. Lyster.—On the Origin of Pearls. Proc. Zool. Soc., 1902, pp. 140-166, pls. xiv-xvii.

Dr. Jameson has investigated the origin of Pearls in *Mytilus edulis*. After a very brief reference to the work of other investigators, he describes the structure of the mantle and shell, and defines the meaning of the terms "pearls," "blisters," and "concretions." As the three terms have been very loosely used in the past, it is important to note that they have each a totally different mode of origin, and should not be confused or regarded as synonyms. A pearl is formed in a closed epithelial sac embedded in the tissues, and formed around a parasite (in *Mytilus* a larval Trematode), which probably causes a specific stimulation. It consists of one or more layers of shell-substance, enclosing a central nucleus. Thus there are nacreous pearls, prismatic pearls, periostracum pearls, and hinge pearls. The parasite does not necessarily become the nucleus of the pearl, it may escape before calcification, leaving behind a granular substance, which serves as "nucleus" for a pearl.

Blisters are caused by the intrusion of foreign bodies between the mantle and the shell, or by the secretion of a nacreous cicatrix to close perforations of boring molluscs, worms, &c.

Concretions are small free calcosphaeritic bodies which occur at times in the connective tissues. In some molluscs they are due to the calcification of degenerated Sporocysts or of dead Cercariae, and to other causes.

The author then describes the minute structure, the origin and development of the pearl and the life-history of the parasite. From Dr. Jameson's work it seems that it is possible to infect *Mytilus* with the parasite, and he discusses the bearing of the facts in his paper upon the problem of artificially producing pearls. It seems clear from this valuable research, that in many molluscs yielding valuable pearls, Trematodes are one, if not the exclusive, cause of pearl formation.

Simroth, H.—Die Nacktschneckenfauna des Russischen Reiches. 4to. pp. 321, 27 Tafn., 10 Karten u. 17 textfign. St. Petersburg : 1901 [1902]. Der K. Akad. d. Wissensch.

Of the many magnificent works which have emanated from the pen of the illustrious Leipzig professor, none have exceeded in interest, or surpassed in the wealth and beauty of illustration, the invaluable memoir before us. No review, limited in space, as here, can do justice to such a work, and we are perforce compelled only to give a very brief resume of the contents.

Commencing with an introduction, Dr. Simroth defines the limits of the region treated of, and the various divisions of the same ; discusses the supposed centres of origin and the lines of distribution, and concludes with a definition of the term "slug."

Passing to the special part of the work, it opens with a detailed account of the anatomy of *Anadenus giganteus* and a consideration of its relationship with other genera. Scattered throughout the accounts of the new genera and species, the author discusses, and adds many original observations and facts to, such subjects as the division of general and species in part by means of colour, the relations of *Heynemannia* and *Lehmannia*, the origin of the genus *Limax*, the colour bands of slugs, distribution of *Paralimax*, classification of *Agriolimax*, the genus *Parmacella*, the Agnathous slugs, conditions of life of the Agnathous slugs, self-fertilisation, and a host of points concerning the generative organs, free-muscles, digestion, affinities, distribution, &c. The work is a mine of information, rich and exhaustive in detail and invaluable to every student of malacology.

The new genera, species, etc., described are as follows :—*Arion subfuscus*, Drp. v. *fennicus*, *A. sibiricus*, *Limax ananowi*, Simr. v. *imereticus*, *L. ordubadensis* (= *colchicus*, Simr.), *Metalimax elegans*, *Monochroma brunneum*, *Paralimax brandti*, v. Mts. forms *coriaceus*, *nubilus*, *notatus*, *lilacinus* *P. marmoratus*, *P. niger*, and form *nigerrimus*, *P. albomaculatus*, *P. salamandroides*, *P. gyratus*, *P. gracilis*, *P. ochraceus*, *P. albocarinatus*, *P. raddei*, and forms *striatus pictus*, *elegans*, *variegatus*, *obscurus* ; *P. minutus*, *Agriolimax luevis*, Müll. v. *perversus*, *A. agrestis*, *L. v. turkestanus*, *A. tauricus*, *A. transcaasicus* and vars. *simplex* and *coeciger*, *A. caspius*, *A. subagrestis*, Simr. v. *minutus*, *A. ilius*, *A. ananowi*, *A. osseticus*. *Tropidolytopelte* is a new subgenus of *Lytopelte* with *L. maculata*, Koch and Heyn., as the type ; also *Liolytopelte* containing two new species, *L. caucasica* and *L. grusina*. A new subgenus of *Gigantomilax*, termed *Turcomilax*, is described, with *G. nanus*, Simr., as the type, and of *Gigantomilax*, s.s. a new species *G. robustus*. The remaining new species are : *Parmacella korschinskii* and v. *rubra*, *P. levandri*, *P. persica*, *Trigono-chlamys minor*, *Pseudomilax reibischi* and *P. ananowi*.

The genus *Phricolestes* named in 1900 is now described with *P. adschasicus* and *P. ponticus* (= *Pseudomilax lederi*, Retowski, non Bottger) ; and the genus *Hyrcanolestes* with *H. valentini*.

In nearly all cases the new genera are accompanied by a wealth of anatomical descriptions and figures, and, as has already been pointed out, many interesting observations upon their habits, habitat, distribution, affinities, etc.

Simroth, H.—Über einige kürzlich beschriebene neue Nacktschnecken, ein Wort zur Aufklärung systematischer Verwirrung. Zool. Anz., 1902, Bd. xxv, pp. 355-357.

Dr. Simroth is of opinion that the genus *Ostracolethe*, described by him in 1901, is the same as *Myotesta*, Cllge., described in the same year. There are, however, quite a number of differences in the two accounts. Dr. Simroth states that the mantle is perforated, and that though the cleft there projects the fine point of a conch-like shell, while Mr. Collinge very emphatically states that the shell is flat and plate-like, and entirely covered and enclosed by the mantle. The radula is also a further point upon which the two authors are at variance.

Simroth, H.—Ueber die wahrscheinliche Herleitung der Gattungen *Monochromo* und *Paralimax*. L'Ann. du Mus. Zool. l'Acad. Imp. Sc. St. Petersb., 1902, T. vii., pp. 283-286.

Simroth, H.—Ueber die Verbreitung der russischen Nacktschnecken. Ibid., pp. 287, 288.

Simroth, H.—Über das natürliche System der Erde. Verhandl. d. Deutschen Zool. Gesell., 1902, pp. 19-42, fign. 1-9.

Simroth, H.—Ueber die Ernährung der Tiere und der Weichtiere im besonderen. Verhandl. d. V. Int. Zool. Con. Berlin, 1901, 1902, pp. 1-9, fig.

Dautzenberg, Ph.—Description de mollusques nouveaux provenant de L'île Obi (Moluques). Le Nat., 1902, pp. 247-248, figs. 1-7.

The author describes and figures the following species, all of which are new: *Trochomorpha subternatana*, *Helix (Albersia) omissa*, *H. (Papuaia) groulti*, *H. (P.) obiensis* and a var. *minor*, *Leptopoma fulgurans* and *L. altius*.

Dautzenberg, Ph.—Observations sur quelques mollusques rapportes par M. Ch. Allaud, du sud de Madagascar. Bull. Soc. Zool. France, 1902, T. xxvii, pp. 196-199.

Dautzenberg, Ph.—Revision des *Cypræidae* de la Nouvelle-Calédonie. Journ. de Conchyl., 1902, vol. 1, pp. 291-384, pl. vii.

The *Cypræidae* of New Caledonia have previously been catalogued by Crosse in 1869, who enumerated 45 species, also by Rossiter in 1882, whose list contained 60 species. The present Revision treats of 70 species, and 52 varieties, 12 of which are new, in addition to which 7 monstrosities are described and figured.

Not wishing here to enter into a discussion of the value of the different divisions of the family, the author adopts four principal genera: *Cypræa* (s.s.) *Luponia*, *Epona* and *Trivia*.

Dall, W. H.—Synopsis of the Family *Veneridae* and of the North American recent species. Proc. U.S. Nat. Mus., 1902, vol. xxvi, pp. 335-412, pls. xii-xvi.

So far as may be represented by any one family, the *Veneridae* represents the culmination of Pelecypod evolution. Although no true *Venerid*,

in the strict sense, appears before the Tertiary, their recognisable ancestry appears in the Upper Cretaceous or Lower Eocene. In the present synopsis Dr. Dall deals with this family in a similar manner to that in which he has already treated other Pelecypod families. Numerous corrections and changes have been made in the nomenclature, and nineteen new species are described and figured.

Ridewood, W. G.—On the structure of the Gills of the Lamellibranchia. Phil. Trans. Roy. Soc., 1903 (ser. B), vol. 195, pp. 147-284, 61 figs. in text.

We have already given a brief outline of this valuable work (see ante, 1902, p. 143); the complete paper is now before us, and we are able to deal with it in greater detail.

The author states that in this investigation, 215 species of these Molluscs, belonging to 118 genera, are taken into account, and their gills were studied both by means of serial sections and dissected preparations. In almost all cases staining was done by means of borax-carmin, followed by picro-nigrosin. After a brief resume of previous work, and some remarks upon the terminology, he passes on to consider the Evolution of the Synaptorhabdic Gill. After reviewing the opinions of previous writers, and comparing them with his own observations, Dr. Ridewood is led to conclude that in the presence of the many conflicting descriptions in closely allied forms, the phenomena of gill ontogeny are extremely difficult to elucidate; and that, pending some further special research, we may "conclude that the perforation or slitting into filaments of a continuous gill-membrane is an infraction of the rule that ontogeny is a repetition of phylogeny." It is of interest to note, that the remarkable diversity of structure exhibited by the ctenidia is not shared by the labial palps. The plication of the lamellae, to which Hancock, and later Duvernoy, attached considerable importance, is now regarded as of less value than the differentiation of principal filaments, which latter are confined to the Pseudolamellibranchia and the Eulamellibranchia. They are not, however, met with in all the Pseudolamellibranchs, as Pelseneer imagined, for in some of the latter the gills are homorhabdic; in non-plicate gills, principal filaments are also wanting. The author considers that the plication of the lamellae and the differentiation of principal filaments are not to be looked upon as of more than specific, or at the most, sub-generic value. The apical filaments, cilia, chitinous skeleton, endothelium, calcified rods, intrafilamentary septa, interlamellar junctions, and interlamellar extensions of the septa, are each dealt with in detail. The calcified rods, on account of the confusion that has arisen with regard to them, are deserving of more than passing notice. He mentions that these structures are peculiar to the *Unionidae* and *Mülleria*, and some authors have failed to discriminate between the thickened bands of chitin, such as occur in the gills of most Eulamellibranchia, and these calcareous rods, which are embedded in the chitin. They are not continuous rods of uniform width extending the full height of the demibranch, but consist of a succession of short rods, which gradually shade off and terminate in the middle of each interfilamentary junction. Dr. Ridewood further states that these rods were discovered by Rengarten in 1853, while the best description of them is that given by Janssens, who, in 1893, showed that they are composed of calcium phosphate, with a little calcium carbonate, and a chitin or conchylin base.

As a result of the investigation, the author confirms the view that ctenidial filaments, held together by ciliated discs, are of essentially simpler structure than those connected by subfilamentar tissue, and the ciliated disc is a more archaic mode of junction than the cellular connection.

It is proposed to abolish the group Pseudolamellibranchia, to remove *Pinna* from the *Aviculidae* and place it in a separate family, the *Pinnidae*, and to include it, and the *Ostreidae* and *Limidae*, in the Eulamellibranchia. The remaining *Aviculidae*, together with the *Pectinidae*, *Spondylidae*, and *Dimyidae*, are to be joined to the Filibranchia, and to constitute a new group the Eleutherorhabda. With regard to the Septibranchia, Dr. Ridewood does not consider there is sufficient evidence to warrant their removal from the Eulamellibranchia, as a separate order, and consequently he places them as a sub-order (*Poromyacea*), and unites them with the remaining Lamellibranchia into one order, which he proposes to term Synaptorhabda.

The following is an outline of Dr. Ridewood's classification:—

- (1) Order Protobranchia.—This is Pelseneer's order adopted without alteration.
- (2) Order Eleutherorhabda.—Arranged in series on the two sides of the gill axis are elongated filaments. Adjacent filaments are held in position by stiff cilia disposed in isolated patches (ciliated discs).

It comprises the sub-orders Dimyacea, Mytilacea, and Pectinacea.

- (3) Order Synaptorhabda.—There are no ciliated discs. The interlamellar edges of adjacent filaments are connected by cellular tissue. These organic interfilamentar junctions are situated at uniform intervals up the filaments, and convert the linear interfilamentar spaces into series of fenestrae.

This order comprises the sub-orders Ostracea, Submytilacea, Tellinacea, Veneracea, Cardiacea, Myacea, Pholadacea, Anatinacea, and Poromyacea.

Dr. Ridewood recognises that the amount of family disruption this scheme involves will doubtless prove startling to the systematist, and he does not claim that it represents in any way the genetic affinities of the forms included. What he aims at, is the "formation of classificatory tables, admittedly artificial and based each on a single character, so that the taxonomist of the future may, by a process of correlation of these tables and a careful weighing of the respective values of the facts therein laid before him in a compact and readily assimilable form, arrive at the truth concerning the phylogenetic history of the Lamellibranchia." The present work is intended as a contribution towards this ultimate object.

The remainder of the paper, and comprising the bulk of it, consists of a minute survey of gill-structure throughout the Lamellibranchia and is accompanied by numerous figures; appended to it, is a very full bibliography which seems to contain references to all the literature bearing upon the morphology of Lamellibranch gills.

The paper is indeed one of the most important contributions the subject has yet received, and is one which will serve as a basis for research in years to come.—A. D. JAMES.

Dall, W. H.—Review of the Classification of the Cyrenacea. Proc. Biol. Soc. Washington, 1903, pp. 5-8.

A brief but important paper, setting forth some surprising changes in nomenclature. *Calyculina*, Clessin, is a synonym of *Musculium*, Link, 1807. Our familiar *Pisidium* is to be called *Corneocyclas*, Ferussac, 1818, with sections and subgenera as follows :—

Subg. *Corneocyclas*.

Sect. *Corneocyclas*, s. str., type *Corneocyclas pusilla*=*Pisidium pusillum* (Gmel.)

Sect. *Phymesoda*, Raf., type *Corneocyclas virginica*=*Pisidium virginicum* (Gmel.)

Sect. *Pisidium*, C. Pfr., type *Corneocyclas annica*=*Pisidium annicum* (Mull.)

Sect. *Cyclocalyx*, Dall, type *Corneocyclas scholtzii*=*Pisidium scholtzii*, Cless.

Subg. *Cymatocyclas*, Dall, type *Corneocyclas compressa*=*Pisidium compressum*, Prime.

Subg. *Tropidocyclas*, Dall, type *Corneocyclas henslowiana*=*Pisidium henslowianum*, Shepp.

At the end of the paper it is indicated that *Cyclas islandica* is the proper name for our *Cyprina islandica* (L.).—T. D. A. COCKERELL.

EDITOR'S NOTES.

It may not be out of place to direct attention to several changes which appear in this, the first part of volume x.

Firstly, we offer a hearty welcome to Mr. H. Howard Bloomer, Mr. G. K. Gude, and Mr. Henry Suter, whose names have been added to the list of editorial colleagues. All are well-known malacologists, and for many years have been active and generous supporters of the Journal.

As to the Journal itself, we have slightly increased the amount of printed matter on each page containing original articles, and the notices of Current Literature, Notes, etc., are printed in a larger type than hitherto.

We have recently received new editions of the well-known and useful catalogues of works and pamphlets treating of the Mollusca, issued by Messrs. R. Friedländer und Sohn (with upwards of 3,000 titles) and that of Mr. W. Junk (1,703 titles), both of Berlin.

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VOL. X.

A REVISION OF THE COLUMBELLIDAE OF THE
PERSIAN GULF AND NORTH ARABIAN SEA, WITH
DESCRIPTION OF *C. CALLIOPE*, N.SP.

By JAMES COSMO MELVILL, M.A., F.L.S.

In the enumeration by Mr. Standen and myself ⁽¹⁾ of the Gastropoda collected, mostly by Mr. Frederick W. Townsend, of the Indo-European Telegraph Service, in the Persian Gulf, Gulf of Oman, and northern portion of the Arabian Sea, twenty-six species of *Columbellidae* are mentioned, of which all excepting one (*Aesopus urania*, M. and S.) belong to the typical genus *Columbella*. To this paper we would refer in explanation of the following notes.

A few months ago some additional material was submitted by us, from the same source, to Mr. Stephen Pace, then engaged on his exhaustive and laborious Catalogue of the *Columbellidae*. We are very much indebted to him for so kindly examining so large a quantity of specimens, and for his pronouncements upon them. He pointed out at the same time one or two errors which had crept into the enumeration; as well as one important omission, that of *C. flavida*, Lam.

The following therefore must be taken as a revised list.

¹ Proc. Zool. Soc. Lond., 1901, vol. ii, pp. 327-460, Pls. xxi-xxiv.

1.—*Columbella pardalina*, Lam.
Columbella propinquans, E.A.Sm.

Probably synonymic. Recorded from both Persian Gulf, Mekran Coast, and North Indian shores.

2.—*Columbella rustica*, Lam.

Mr. Pace so determines two or three examples collected by Mr. Townsend at Bombay, and which were referred at first to *C. fuscata*, Sowb. This last is a native of Panama, St. Elena, and Monte Christo, W. Central America. It is the first record of the Mediterranean *C. rustica* being found beyond the Gulf of Suez. The examples are not quite typical, and we hope a further supply may come to hand, in order that the important question of its geographical distribution be more definitely studied.

3.—*Columbella versicolor*, Sowb.

Hab.—Mekran Coast, near Charbar.

4.—*Columbella (Mitrella) agnesiana*, Melv. and St.

Hab.—Persian Gulf : Bushire ; Gulf of Oman ; Maskat, 10 fathoms ; Mekran Coast : Charbar, sandy mud, 15 fathoms.

5.—*Columbella (Mitrella) alizonae*, Melv. and St.

Hab.—Persian Gulf : Shaikh Shuaib Island, and at Bushire. Also in lat. 27° N., long. 52° E., on the telegraph cable. Received in 1902 from Maskat, at 47 fathoms, very varied in pattern and in fine condition. India : lat. 18° 58" N., long. 71° 45" E., 40 fathoms.

6.—*Columbella (Mitrella) astolensis*, Melv. and St.

Hab.—Mekran Coast : Astola Island, 3 fathoms, sand. Also off Charbar at 7 fathoms.

7.—*Columbella (Mitrella) blanda*, Sowb.

Hab.—Persian Gulf : Gulf of Oman, lat. 24° 55" N., long. 57° 59" E., 30 fathoms, sand and mud.

A beautiful pale form, with clearly traced longitudinal markings, and hardly a vestige of dorsal clouding, has been very recently dredged by Mr. Townsend in the Gulf of Oman, at 205 fathoms, also occurring in the same form off Bahrein in the Persian Gulf.

Var. *candidans*, Melv. and St.

Hab.—Karachi.

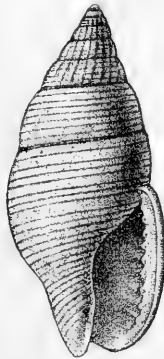
An interesting, pure white, unmarbled form.

8.—*Columbella* (*Mitrella*) *calloiope*, n.sp.

C. testa ovata, versus apicem attenuata, laevigata, solidula, anfractibus octo, quorum duo apicales laeves, vitrei, quatuor his proximi longitudinaliter laevicostati, costis numerosis sed inconspicuis, anfractu ultimo et penultimo laevibus, spiraliter aretissime brunneolineatis, apertura ovato-oblonga, labro intus multidenticulato, crassiusculo, columella versus basim recta.

Long. 12, lat. 5 millim.

Hab.—Bombay (Alexander Abercrombie, Esq.).



This was formerly esteemed by us as a form of *C. marquesa*, Gaskoin, of the variety *b.* figured in Reeve, *Conch. Icon.*, f. 217, and so catalogued both in the Bombay list⁽²⁾, and the enumeration of the Mollusca of the Persian Gulf and Arabian Sea.⁽³⁾

Last year it was examined by Mr. Stephen Pace, who considers it quite distinct, and worthy of a specific name. We have only seen two or three examples, which, however, show no tendency to variation, and are identical both in form, marking, and colour.

9.—*Columbella* (*Mitrella*) *cartwrighti* (Pace MS.), Melv.

Hab.—Persian Gulf : Bahrein Is. (Captain Cartwright).

Usually found at about 7 fathoms ; muddy sand bottom.

10.—*Columbella* (*Mitrella*) *doriæ*, Issel.

Hab.—Persian Gulf : Bushire (M. F. Houssay).

Perhaps a variety of *C. mindoroensis*, Rve. The specimen in the Townsend collection is very doubtfully referred here.

11.—*Columbella* (*Mitrella*) *euterpe*, Melv.

Hab.—India : Karachi (F. W. Townsend), Bombay (A. Abercrombie).

Common in both these localities, but not yet reported elsewhere.

² Mem. Manch. Soc., 1893 (s. 4), vol. vii, pp. 17-51.

³ Op. cit.

12.—Columbella (Mitrella) flavilinea, Melv.

Hab.—India : Bombay (A. Abercrombie). Not common ; and as yet not noticed in the Townsend collections.

13.—Columbella (Mitrella) nomadica, Melv. and St.

Hab.—India : Karachi.

A handsome form, figured in the Proc. Zool. Soc. Lond., 1901, vol. ii, pl. xxi, f. 7. Received by Mr. S. Pace : not yet collected by Mr. Townsend.

14.—Columbella (Mitrella) zebra, Gray.

Hab.—Persian Gulf : Linjah, 3 fathoms ; Mekran Coast : general.

C. miser, Sowb., and *C. elata*, Rve., are apparently but forms of the above.

15.—Columbella (Mitrella) terpsichore, Leathes.

Hab.—India : Bombay (A. Abercrombie).

Sometimes confused with *C. miser*, Sowb.

N.B.—*C. (Mitrella) rugulosa*, Sowb., had best be erased from the former list. It was reported on insufficient authority, from Karachi, but being a well-marked species, only known from the Galapagos Islands, there but little doubt that it does not occur in Indian Seas.

16.—Columbella (Atilia) albonodulosa, Gaskoin.

Hab.—Mekran Coast : Local.

17.—Columbella (Atilia) conspersa, Gaskoin.

Hab.—Persian Gulf ; India : Karachi.

This is synonymous with *C. puella*, Sowb., from the Andaman Isles.

Amongst the specimens in the Townsend collection from Karachi are some labelled by a *lapsus calami*, *C. compressa*, Gask., a misprint for *conspersa*.

18.—Columbella (Seminella) melitoma, Melv. and St.

Hab.—India : Karachi.

19.—Columbella (Seminella) phaula, Melv. and St.

Hab.—India : Karachi.

20.—Columbella (Seminella) selasphora, Melv. and St.

Hab.—India : Karachi.

N.B.—*C. atomella*, Duclou, reported from Bombay, seems an agglomeration, mostly worn, of the three recently separated species just mentioned.

21.—Columbella (Seminella) townsendi, Melv. and St.

Hab.—India : Karachi.

22.—Columbella (Conidea) flava, Brug.

Hab.—Mekran Coast; India: Karachi (Townsend), Bombay (Abercrombie).

This is the *C. flavida* of Lamarek.

23.—Aesopus urapia, Melv. and St.

Hab.—Mekran Coast: Local. The white variety (*albens*) occurring with the type. For a full description of this interesting mollusc, see the paper above quoted, p. 407.

THE ANATOMY OF CERTAIN SPECIES OF CERATISOLEN AND SOLECURTUS.

BY H. H. BLOOMER.

(Plate ii.)

Ceratisolen legumen, L.

Owing to the many points of resemblance of *Ceratisolen legumen* to the species of *Solen*, already described by me¹, I purpose contrasting it with *Solen ensis* in the same manner as I have dealt with *S. siliqua*, *S. vagina*, and *S. pellucidus*.

EXTERNAL CHARACTERS.

C. legumen is comparatively shorter and deeper than *S. ensis*. It not only curves slightly along its dorsal surface, but also along the ventral one, particularly at the anterior end. The bands of pallial muscles pass round the anterior part of the mantle lobes, and proceed posteriorly to where the dorsal integument is connected with the teeth of the shell (Fig. 1, *H.*), the latter being situated some distance away from the anterior end.

The foot (Fig. 1, *F.*) gradually increases in depth towards its distal end, and is there of considerable size.

The pedal aperture, situated at the anterior end, extends a short distance along the ventral surface, and the mantle lobes at the posterior part of it carry on their inner surfaces a tentacular fringe, which evidently represents the fourth aperture (Fig. 1, *F. A.*).

Along the dorsal surface from the anterior end to near the teeth of the shell (Fig. 1, *H.*) there is no concrescence of the mantle lobes, thus forming an aperture to a chamber superior to the anterior adductor muscle. Anteriorly this chamber communicates with the pallial chamber, the aperture of which is continuous with the pedal aperture. The edges of the mantle lobes bordering the whole of this dorsal chamber bear a tentacular fringe, but the fringe does not pass round the anterior end of the lobes.

¹. Journ. Malac, 1901, pp. 36 & 97; 1902, pp. 18 & 133.

The free portions of the siphon (Fig. 1, *In. S'*. & *Ex. S'*.) are long and narrow, and their distal ends turn dorsally.

The inner parts of the bases of the gills are joined together as in *S. marginatus*.

MUSCULATURE.

i. *The Pallial Muscles*.—The muscular bands along the pallial edge pass round the anterior end, and proceed posteriorly as far as the junction of the mantle lobes with the dorsal integument, and close to the part of the latter penetrated by the teeth of the shell (Fig. 1, *II.*). At the posterior end, where the mantle lobes form the proximal portion of the siphon, the walls of the two chambers are more muscular, and the divisional wall of greater length.

The anterior adductor muscle (Fig. 1, *A. A.*) is a broad plate of muscles attaining its maximum depth in the posterior part. Anteriorly it curves slightly towards the dorsal surface.

The posterior adductor muscle (Fig. 1, *P. A.*) is situated more posteriorly, and the muscular dorsal integument between it and the siphon is consequently shortened.

ii. *The Pedal Muscles*.—The muscles of the distal end of the foot are very strongly developed. The retractor pedis anterior muscles are thick, and do not extend far anteriorly; while the bifurcated parts (Fig. 1, *P. R. A.*, *P. R. A'*.) are also short. When the muscles reach the foot, the fibres pass in a posterior direction under, instead of over, the longitudinal pedal muscles, as in *S. marginatus*.

The bifurcated parts of the retractor pedis posterior muscles (Fig. 1, *P. R. P.*) are longer than in *S. ensis*.

ALIMENTARY CANAL.

The oesophagus (Figs. 2 and 3, *Oe*) is short, proceeds a little distance dorsally; and curving, passes into the stomach. The stomach is proportionately larger than in *S. ensis*. There are no divisional walls between the oesophagael and cardiac portions (Fig. 2, *C. St.*), while the pyloric portion (Fig. 2, *P. St.*) is large, and assumes a more ventral position, having the appearance of being somewhat drawn towards the pedal cavity. The central cavity (Fig. 2, *Cav.*) is large, and its divisional walls are more marked, particularly on the dorsal and posterior sides. The sac of the crystalline style (Fig. 1, *C. C.*) leaves the pyloric portion on its ventral side more anteriorly. It goes some distance along the pedal cavity, as in *S. marginatus*. The intestine (Fig. 1, *In.*) leaves the stomach, and passes directly along the surface of the sac of the crystalline style (Fig. 1, *C. C.*), adhering to it nearly the whole of its length, going along the dorsal surface and returning along the ventral one. It then curves round the pyloric portion, and on its dorsal side continues as the rectum (Fig. 1, *R.*), the latter runs posteriorly to the cloacal chamber, and terminates

in a *bilobed* anus (Fig. 1, A.). As previously mentioned, the anus is situated more posteriorly than in *S. ensis*.

The liver (Fig. 1, L.) is situated as in *S. ensis* over the fore-part of the stomach, and passes for a short distance over the anterior adductor muscle, and posteriorly under the stomach as far as where the intestine leaves it.

NERVOUS SYSTEM.

The nervous system, like that of *S. pellucidus*, differs from *S. ensis* in the number of the pallial nerves. Each anterior pallial nerve gives rise to one branch only, which leaves the main nerve just after it reaches the anterior adductor muscle, and crosses the mantle lobe, then divides, the two parts joining the circum-pallial nerve.

The posterior pallial nerve does not give rise to any branch which crosses the mantle lobe as in *S. ensis*.

There is only one circum-pallial nerve.

CIRCULATORY SYSTEM.

This is the same as in *S. ensis*, excepting in a few minor details.

Solecurtus strigillatus, L.

EXTERNAL CHARACTERS.

The mantle lobes are comparatively short and wide. They project separately some little distance anteriorly from the dorsal surface of the anterior adductor muscle, and in a semi-circular curve form the pedal aperture; while posteriorly they are broader, and from a position above the posterior adductor muscle run with a slighter curve laterally. In the anterior part of the mantle lobe the muscles of the pallial edge are wide and thick, but they gradually diminish in width towards the posterior end. The pedal aperture, lying ventrally, extends in a dorso-posterior direction, and on each mantle lobe is bordered by a muscular flap. The mantle lobes are connected ventrally with each other by a wide piece of muscular tissue, which posteriorly is continuous with the proximal portion of the inhalent siphonal chamber. Dorsally the proximal portion of the siphon is for some distance from the median line connected with the mantle lobes and the dorsal integument; while the muscles, chiefly from the lateral portion of it, pass under the mantle lobes and afterwards through them in large and powerful siphonal retractor muscles, and are attached to the valves of the shell.

The external surface of the muscular tissue connecting the ventral portions of the mantle lobes, the free edges of the mantle lobes, and the proximal portions of the siphonal chambers are coloured a mottled brown, but the brown colour of the free portions of the siphon is of a more consistent nature. This colouring, however, appears to be subject to variation, and some specimens are nearly white.

In an extended condition the proximal portion of the siphon is of considerable length, and nearly of a uniform size, but in a contracted state it is larger at the centre and compressed at the ends. The free portions, when fully extended, are likewise of considerable length. One specimen measured 6 c.m. along the median line from the posterior adductor muscle to the anterior adductor muscle, and the proximal portion of the siphon, though not fully extended, was of the same length. Part of the free portions were missing, this being usually the case, as presumably being due to the action of the preservative medium on the arrangement of the circular muscles forming the lateral ribbings, and making them of a somewhat brittle nature. In another instance the proximal portion of the siphon was in a very contracted condition, and only measured 2 c.m.; while the free portion of the exhalent chamber measured 5.5 c.m., and the inhalent one 6.1 c.m.

There is no fourth aperture.

The foot is very large, being deep and muscular. The periostracum passes from the mantle lobes to the edges of the valves.

The dorsal integument posterior to the teeth of the shell is thin, and it is to be observed that the teeth deeply penetrate into the viscera.

The gills are long, and extend in a more or less folded condition to the posterior end of the proximal portion of the inhalent siphonal chamber, to which they are attached.

The inner parts of the bases of the gills are joined together, forming the division between the two siphonal chambers.

MUSCULATURE.

i. *The Pallial Muscles.*—The muscles along the edges of the mantle lobes form anteriorly deep bands, which diminish in width as they pass posteriorly. From the ventral border of the anterior and posterior margins of each lobe proceed two muscular bands, which cross the piece of muscular tissue connecting the ventral edges of the mantle lobes, and converging towards each other, meet and unite at the centre of the tissue. They evidently act as retractor muscles for the purpose of drawing together the ventral parts of the mantle lobes. The walls of the proximal portion of the siphonal chambers (Fig. 4, *Ex. S'*. & *In. S'*.) are thick and muscular, and continuous with the dorsal integument and the mantle lobes. Chiefly laterally they give rise to two large muscles which pass through the mantle lobes, and from a large surface adhere to the valves of the shell. These undoubtedly act as siphonal retractor muscles.

On the inside of each lateral part of the proximal portion of the siphon and between the two chambers, is a large muscular ridge (Fig. 4, *S. R.*), to which adhere the outer sides of the bases of the gills. At the posterior end of the proximal portion of the siphon it decreases in size, and continues

as the free portions (Fig. 4, *Ex. S'* & *In. S'*). The interior muscles of the siphon are chiefly longitudinal and the outer ones circular, the latter thus forming internal and external coverings.

Externally, the free portions of the siphon are ribbed laterally. Internally, they are also ribbed laterally, but not so deeply; whilst longitudinally there are a number of rounded ribbings, with finer ones between. The chambers gradually taper towards their distal ends.

The anterior adductor muscle (Fig. 4, *A. A.*) is a comparatively narrow plate of muscles. It spreads out on either side from the median line, and obtains its maximum width where it is connected with the valves of the shell. Dorsally, it is joined with the dorsal integument and the mantle lobes. Posteriorly, it is connected with the ventral integument.

The posterior adductor muscle (Fig. 4, *P. A.*) is also a narrow plate of muscles joined anteriorly by connective tissue with the retractor pedis posterior muscle, and posteriorly with the dorsal integument, the siphon and the mantle lobes.

ii. *The Pedal Muscles.*—The foot (Fig. 4, *F.*) is very large, deep and muscular. The muscles are of three kinds, viz., longitudinal, transverse, and circular. In the proximal portion, where the greater part of the viscera is situated, the walls are thin and the muscles lie close together. Inside the muscular integument are two layers of longitudinal muscles, between which is a circular layer which passes around the foot at a right angle to its axis. There are numerous bundles of transverse muscles which cross the foot between the other muscles to the pedal integument. They are also plentiful in the proximal part, where they pass either between or through the viscera. Towards the distal half the muscles begin to fray out more, intermingle with each other, and gradually increasing in number soon become a network of powerful muscles, thus making the distal portion an exceedingly muscular mass.

The anterior retractor pedis muscles (Fig. 4, *P. R. A.*) are short and thick, passing at the side of the liver to the valves. When they reach the foot the muscle fibres spread out, passing both ventrally and anteriorly over the inner longitudinal muscles, and bury themselves in the pedal integument. There are no bifurcations of the free portions of the muscles.

The posterior retractor pedis muscle (Fig. 4, *P. R. P.*) is comparatively short, and bifurcates at its posterior end, the bifurcated parts being attached by their dorsal surfaces to the valves of the shell. They are joined by connective tissue with the posterior adductor muscle. On reaching the pedal cavity the muscle spreads out; and the fibres, passing in an anterior direction as a portion of the longitudinal muscles of the foot, eventually merge themselves in the pedal integument.

The elevator pedis muscles (Fig. 4, *E. P.*) are situated at the posterior dorsal point of the foot, and are connected with the valves at their most dorsal parts.

Attached to the shell between each of the elevator pedis and siphonal retractor muscles is a long and narrow muscle, which is connected with the muscular tissue running along the base of the gills, and evidently acting as a branchial retractor muscle for the purpose of folding the gills into a close mass when the proximal portion of the siphon is contracted.

ALIMENTARY CANAL.

The mouth (Figs. 5 & 6, *M.*), a transverse opening of the ventral integument, is situated under the posterior portion of the anterior adductor muscle, and between it and the foot. The lips (Figs. 5 and 6, *A. L.* and *P. L.*), formed by the junction of the labial palps, project forwardly.

The oesophagus (Figs. 5 & 6, *Oe.*) is narrow, of medium length, and proceeds posteriorly to the stomach.

The stomach (Figs. 4, 5 and 6, *St.*) is an irregularly-shaped sac, containing a number of divisions. This applies particularly to the left side, which is divided into four parts by muscular ridges. For convenience, I will call the divisions Anterior, Posterior, Central, and Dorso-central. Towards the centre of the left half is an oval muscular ridge (Fig. 5, *C. D. R.*) completely bordering a deep cavity—the central division (Fig. 5, *C. D.*). The lumen soon spreads out, and extends a considerable distance anteriorly and posteriorly. On the dorsal side, and continuous with this ridge, is a slighter one (Figs. 4 and 5, *A. D. R.*) passing along the dorsal surface of the stomach down the right side, and returning along the ventral surface in a more pronounced degree, and joining the ventral side of the ridge of the central division, thus separating the anterior division from the posterior portion of the stomach. The postero-dorsal part of the ridge of the central division is developed into a muscular papilla (Fig. 5, *M. P.*). From the posterior side of the base of the papilla runs another muscular ridge (Fig. 5, *P. St. R.*), which first separates the dorso-central from the posterior division, and then passes along the dorsal surface in a posterior direction towards the median line, and disappears. The Dorso-central division (Fig. 5, *D. D.*) is smaller, but of considerable depth, and lies above the muscular papilla. The Posterior division (Fig. 5, *P. St.*) is very large. The ventral portion, after narrowing, forms the opening of the caecum of the crystalline style (Fig. 5, *C.C.*) and intestine (Fig. 5, *In.*). The caecum of the crystalline style is a large and long sac, passing first in a ventral direction, then gradually curving, terminates near the dorsal surface of the pedal cavity. When the caecum and the intestine leave the stomach, the intestine (Fig. 4, *In.*) on the right anterior side of the caecum, they are only partly divided from each other, the intestine being small and appearing as a narrow, deep, and irregular groove on the side of the caecum. At the distal end of the caecum the intestine becomes quite separate, and the typhlosole commences, formed by the invagination of a

portion of the intestinal wall. It then returns along, and connected with the right dorsal side of the caecum for about two-thirds the length of the latter, when, becoming free, it makes a few folds and the typhlosole disappears. The intestine then makes a large number of irregular folds, and continuing as the rectum passes through the ventricle, shortly reaches the posterior adductor muscle, passes closely round it, and returning a short distance along the ventral surface, terminates in a large bilobed anus having a circular appearance (Fig. 4, A.).

The crystalline style (Figs. 6 & 7, *C. S.*) fills the greater part of the caecum, and extends to the anterior portion of the stomach.

The tricuspid body occupies the centre of the stomach, and has branches radiating into the different divisions.

A transverse section across the caecum of the crystalline style and the intestine of *Solecurtus candidus* (Fig. 7), shows the former to be lined with a columnar epithelium (*Ep. Col.*), carrying a dense fringe of long cilia, the nuclei are situated with regularity near the centre of the cells a little closer to the base than the free end; while the latter—the intestine—is lined with an epithelium (*Ep. I.*), consisting of short ciliated cells, broad, and chiefly connected with each other at the free end, narrowing towards the base, and having undeveloped cells and spaces between. The division of the caecum from the intestine is marked by a constriction of the enveloping muscular layer. On the one side the columnar epithelium passes inside this constricted part and a short distance along the side of the intestine, gradually merging into the intestinal epithelium. On the opposite side, however, occurs a curious growth (*Ep. W.*), where the epithelium consists of very long cells of uniform width, and passing from the base to the free end in a slight wave-like course, the nuclei being abundant and situated in the basal portion of the cells. It, however, ends abruptly at the point where the wall projects farthest into the lumen, marking on this side the division between the caecum and the intestine, and the smaller intestinal cells then follow; on the other side of it the cells gradually decrease in length, until they merge into the ordinary columnar epithelium of the caecum. The cilia on this curious growth of epithelium are scanty and short, and near the intestinal cells it apparently altogether disappears. In this latter part there is a break in the epithelium (*Ep. B.*), which continues through a number of sections, and then the epithelium resumes its normal condition. It is probably a duct communicating with the gland underneath the epithelium. It may be remarked this curious piece of epithelium closely resembles that described by Johnstone in *Cardium*.⁽²⁾

The liver or digestive gland (Fig. 4, *L.*) is a large organ surrounding the stomach, with the exception of a small portion of the dorsal and posterior parts. The large bile duct enters the stomach on the ventral surface,

² *Cardium*, Liverpool Marine Biological Committee Memoirs.

just anterior to where the intestine leaves it. The small bile duct opens into the central division.

The whole of the viscera in the proximal part of the foot is bound together also with the pedal muscles, by a large quantity of connective tissue.

CIRCULATORY SYSTEM.

Menegaux ⁽³⁾ states that the general circulatory system agrees with that of *Solen*.

The venous blood is collected into the various sinuses, and from the sinus of the viscero-parietal ganglion it is conveyed by the afferent branchial vessels to the gills, and from them by the efferent branchial vessels to the auricles.

Over the posterior portion of the foot lies the large ventricle, with large triangular auricles. The anterior aorta proceeds a short distance along the rectum, until it reaches the muscular portion of the foot; then continues under the dorsal integument, and gives off a number of branches which vascularise the viscera, anterior adductor muscle, the mantle lobes, and the foot. The posterior aorta shortly after leaving the ventricle, forms the dilation known as the bulbus arteriosus; and then, dividing, continues along the mantle lobes, and sends branches to the posterior adductor muscle and the siphon.

The gills extend horizontally from a position between the labial palps, and level with the retractor pedis anterior muscles, right to the posterior end of the proximal portion of the siphon. The inner parts of the bases of the gills are connected together, while the outer parts are joined with the walls of the siphonal chamber, thus separating the exhalent from the inhalent chamber. When the siphon is contracted, the gills are folded on themselves in a close mass, while in an extended condition these folds disappear.

The gills belong to the type which Dr. Ridewood ⁽⁴⁾ has termed synaptorhabdic, and he states: "The lamellae are highly plicate, the plicae being flattened antero-posteriorly, so as to resemble the leaves of a book. The number of filaments in a plica are about 30 in the outer, and 40 in the inner demibranch. . . . The principal filaments are large, and have a broad, shallow, frontal groove, from the middle of which there sometimes arises . . . a ridge of tall epithelial cells. There is a fair amount of muscle fibre, running some vertically and some horizontally in relation with the principal filaments."

The kidneys are situated posterior to the liver and elevator pedis muscles, but do not extend far posteriorly; while laterally they go a considerable distance, passing along the mantle lobes to the siphonal retractor muscles. Menegaux ⁽⁵⁾ states the viscero-renal orifices exist as in *Solen*.

³ Recherches sur la circulation des Lamellibranches Marins, 1890.

⁴ Phil. Trans., 1903 (ser. B.), vol. 195, pp. 147-281.

⁵ *Op. cit.*

NERVOUS SYSTEM.

The cerebro-pleural ganglia are situated between the posterior portion of the anterior adductor muscle and the ventral integument, just antero-laterally to the retractor pedis anterior muscles. They lie some distance apart, and are joined by a commissure. Anteriorly, each ganglion gives rise to a nerve, which passes underneath the anterior adductor muscle, innervating it, and then continues as the pallial nerve.

Posteriorly, a connective joins each cerebro-pleural with the visceroparietal ganglion. The connective passing between the retractor pedis anterior muscle and the body wall, buries itself in the latter, shortly afterwards it emerges and clings close to the wall. Then, becoming free, it continues between same and the viscera until it reaches the bifurcated parts of the retractor pedis posterior muscles, and passing through the inside wall, joins the visceroparietal ganglion.

Each cerebro-pleural ganglion is also joined by a connective with the pedal ganglion. The connective immediately becomes buried in the muscular body wall; and passing between the longitudinal and transverse muscles of the foot, joins the pedal ganglia.

The visceroparietal ganglia are large, and situated between the bifurcated portions of the retractor pedis posterior muscle. Posteriorly the ganglia give rise to two branchial nerves, which pass directly to the gills; also to two nerves, which give off a number of branches, innervating the posterior adductor muscle, the posterior portion of the dorsal integument, and the siphon. On each side one large branch—the pallial nerve—crosses the siphonal retractor muscle, and continues round the mantle lobe as the circumpallial nerve.

The pedal ganglia are situated in the proximal portion of the foot above about the centre of the caecum of the crystalline style, among the transverse muscles, and are surrounded by muscular connective tissue. They give off a number of nerves, which, passing between the longitudinal and transverse muscles, innervate the foot.

Solecurtus candidus.

EXTERNAL CHARACTERS.

The anterior portions of the mantle lobes curve slightly more than in *S. strigillatus*. Posteriorly the lobes from a more anterior position over the posterior adductor muscle take a greater curve, and consequently project more posteriorly. The edges of the lobes are more crenulated, particularly the parts bordering the pedal cavity, and they carry a tentacular fringe. The edges of the mantle lobes are of an orange colour, while the remaining part of the animal is nearly white, with the exception of the distal portion of the foot, which has a dirty orange tinge. The internal structure is similar to *S. strigillatus*. It is impossible to say whether the slight differences noticeable are constant or not, owing to the limited number of specimens examined.

REFERENCE LETTERS.

A.	Anus.	In.	Intestine.
A. A.	Anterior adductor muscle.	In. R.	Returning intestine.
A. D. R.	Ridge separating the anterior from the other portion of the stomach.	In. S.	Proximal portion of the inhalent siphonal chamber.
A. L.	Anterior or upper lip.	In. S ¹ .	Free portion of the inhalent siphonal chamber.
C. C.	Caecum of crystalline style.	L.	Liver.
Cav.	Cavity receiving the small bile duct.	M.	Mouth.
C. D.	Central division of the stomach.	M. P.	Muscular papilla.
C. D. R.	Ridge bordering the central division of the stomach.	Oe.	Oesophagus.
C. S.	Crystalline style.	P. A.	Posterior adductor muscle.
C. St.	Cardiac portion of stomach.	P. L.	Posterior or lower lip.
Con. T.	Connective tissue.	P. R. A. P. R. A ² .	Retractor pedis anterior muscle.
D. D.	Dorso-central division of the stomach.	P. R. P.	Retractor pedis posterior muscle.
Ep. B.	Break in the curious growth of epithelium, probably a duct.	P. St.	Posterior division of the stomach.
Ep. C.	Ciliated epithelium.	P. St. R.	Ridge running along part of dorsal surface of the posterior division of the stomach.
Ep. Col.	Columnar epithelium.	R.	Rectum.
E. P.	Elevator pedis muscle.	S. R.	Ridge dividing the inhalent from the exhalent chamber of the proximal portion of the stomach. <i>siphon</i>
Ep. W.	Curious growth of epithelium.	St.	Stomach.
Ex. S.	Proximal portion of the exhalent siphonal chamber.	T. P. M.	Transverse pedal muscles.
Ex. S ¹ .	Free portion of the exhalent siphonal chamber.	Ty.	Typhlosole.
F.	Foot.	V.	Ventricle.
F. A.	Tentacular fringe representing the fourth aperture.		
F. In.	Folded portion of the intestine.		
H.	Point where the dorsal integument is connected with the teeth of the shell.		

EXPLANATION OF PLATE II.

- FIG. 1. *Ceratisolen legumen*, L. View from the right side, showing alimentary canal, &c. $\times 1\frac{1}{2}$.
- FIG. 2. *Ceratisolen legumen*, L. Longitudinal section of the stomach, showing internal structure of the left side. $\times 1\frac{1}{2}$.
- FIG. 3. *Ceratisolen legumen*, L. Longitudinal section of the stomach, showing internal structure on the right side. $\times 1\frac{1}{2}$.
- FIG. 4. *Solecurtus strigillatus*, L. View from the right side, showing alimentary canal. $\times \frac{3}{5}$.
- FIG. 5. *Solecurtus strigillatus*, L. Longitudinal section of the stomach, showing internal structure of the left side. $\times 2$.
- FIG. 6. *Solecurtus strigillatus*, L. Longitudinal section of the stomach, showing internal structure of the right side. $\times 2$.
- FIG. 7.—*Solecurtus candidus*. Transverse section through the caecum of the crystalline style and intestine of *Solecurtus candidus*, showing the relation of one to the other. $\times 16$.

CLASSIFICATION OF THE BRITISH SPECIES OF THE GENUS SOLEN, LINNÉ.¹

By H. H. BLOOMER.

Having recently described some of the chief features in the anatomy of the species of *Solen*, I now purpose considering how they bear on the question of the present classification. For this purpose it will be sufficient if I only call attention to the chief points by which the other species differ from *S. ensis* without going into the anatomy of the latter.

The chief differences in *S. siliqua* are :—It is larger, and quite straight along the dorsal surface. The oesophagus is straighter, and the divisions of the stomach are more pronounced. The cardiac portion does not project so far anteriorly, nor does the posterior end of the pyloric portion rise so much dorsally, and the muscular papilla is more central.

In *S. marginatus* the following are the chief points of difference :—It is straight along the dorsal surface. There is no fourth aperture, and there are no labial grooves. The inner parts of the bases of the gills are joined together. The free portion of the siphon is longer. The pallial and pedal muscles are more developed. The free portion of the retractor pedis anterior muscle is shorter, the bifurcations lie close together, and the fibres of it cross the foot in a posterior direction, passing underneath instead of over the longitudinal muscles. The lips project anteriorly, the oesophagus is longer and proceeds posteriorly to the stomach, the latter lying in a more posterior position over the distal end of the foot. The muscular wall dividing the oesophagael from the cardiac portion is more developed, and projects a considerable distance into the stomach, thus separating the anterior part of these divisions from each other. The caecum of the crystalline style is of considerable length, leaves the pyloric portion on its ventral surface, curves, and passes in an anterior direction. The intestine passes along the caecum, round the distal end, and returns along the other side, and is connected with it for the greater portion of the distance. The liver does not project anteriorly over the anterior adductor muscle. Anteriorly each cerebro-pleural ganglion gives rise to only one nerve—the anterior pallial nerve—which has one branch. There is only one circum-pallial nerve.

Solen pellucidus possesses some features of resemblance to *S. ensis*, some to *S. marginatus*, and others not common to either of these species.

¹ Read at a meeting of the Midland Malacological Society.

It will, therefore, be assumed that the points not hereafter mentioned are the same as in *S. ensis*. It resembles *S. marginatus* in the following points:—In the strong development of the pedal muscles. The inner parts of the bases of the gills are joined together. The fibres of the retractor pedis anterior muscles cross the foot under, instead of over, the longitudinal ones. The long oesophagus and position of the stomach. The shape of the anterior part of the stomach. The length and direction of the caecum of the crystalline style. In possessing only one circumpallial nerve.

The features by which it differs both from *S. ensis* and *S. marginatus* are:—The hinge of the shell is situated some distance from the anterior end, and the anterior part of the anterior adductor muscle, together with the dorsal integument, terminate there. What represents the fourth aperture is present at the postero-ventral part of the pedal aperture. The presence of a supra-pedal chamber at the antero-dorsal end. The large pyloric portion of the stomach, and of the proximal part of the caecum of the crystalline style, and the absence of folds in the intestine shortly after leaving the stomach. The numbers of branches of the anterior pallial nerve, which are more than in *S. marginatus*, but fewer than in *S. ensis*.

It is admitted that the type of the genus *Solen* is *S. vagina*, Linné⁽¹⁾, and it is evident that the anatomical differences between *S. vagina* and *S. ensis* and *S. siliqua* prevent the two latter being placed in the same genus. In the recent classification⁽²⁾ these two species have been placed in the genus *Ensis*, Schumacher, and I do not see any reason why this should be altered. That there are distinctive, and what I have found to be constant, characters, I think I have shown, thus justifying them being treated as separate species, and not varieties. There now remains *S. pellucidus*. This animal I have endeavoured to demonstrate possesses some characters common to *S. ensis*, some common to *S. vagina*, and others possessed by neither of them. It, therefore, follows that *S. pellucidus* cannot be placed in the genus *Solen* or *Ensis*. In the before-mentioned classification it has been placed in the genus *Cultellus*, Schum., and as I have not been able to see the type animal of Schumacher's genus (*C. magnus*), I cannot at present say if anatomically this is correct or not.

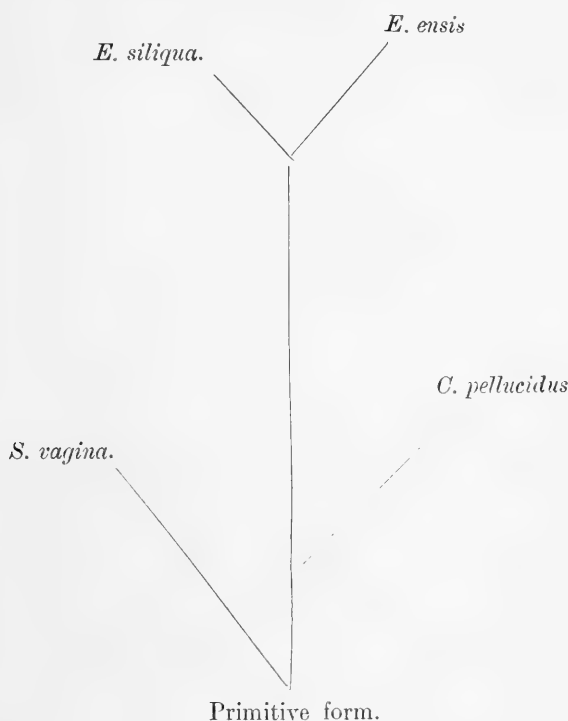
I look upon *Solen vagina* as a more primitive form, and upon *Ensis ensis* and *E. siliqua* as more specialised forms—perhaps *E. ensis* slightly more so than the *E. siliqua*, and *Cultellus pellucidus* coming somewhere between *S. vagina* and *E. siliqua*. I do not, however, suggest that any one species has directly originated from the other. Perhaps the following tree will better illustrate what I wish to convey:—

¹ British Conchology, Jeffreys.

¹ A History of British Mollusca and their shells. Forbes and Hanley.

¹ Synopsis of the *Solenidae* of North America and the Antilles. Dall.

² List of British Marine Mollusca prepared by a Committee of the Conchological Society of Great Britain and Ireland.



Since the publication of Dr. Ridewood's valuable work on the structure of the gills of the Lamellibranchia no review of their classification would be complete without a reference to it ; but as I propose referring to the work in more detail at a later date when dealing with the classification of other genera of the *Solenidae*, I will only now say that I do not see anything in it disagreeing with the above conclusions.

ON THE ORIGIN AND FUNCTION OF THE FOURTH APERTURE IN SOME PELECYPODA.

BY H. H. BLOOMER.

It has been suggested that the origin of the fourth aperture corresponds with a rudimentary fissure for the byssus. While this may explain the cause of the orifice in certain of the Pelecypoda, I have from observations come to the conclusion that in others the origin is totally dissimilar ; and, further, in those to which this theory may apply it has in certain cases since been utilised for an altogether different function. It is noticeable

that in the animals possessing the fourth aperture the coneresced ventral portion is comparatively of considerable length. Pelsenceer⁽¹⁾ calls attention to this feature. It must, however, be observed that there are genera belonging to these families having proportionately the same extent of ventral conerescence, in which the orifice does not occur.

I have recently attempted to show that *Solen vagina* is a more primitive form than *Ensis ensis* or *E. siliqua*, that *Cultellus pellucidus* lies between *S. vagina* and *E. siliqua*; and, further, that the position of *Ceratisolen legumen* is between *S. vagina* and *C. pellucidus*. *S. vagina* has no fourth aperture, neither has *C. legumen*, but in the latter the dorsal and ventral surfaces of the pedal aperture carry a tentacular fringe, and extend further posteriorly. In *C. pellucidus* what represents the fourth aperture is also present, but whether it is separated from the pedal aperture I have not been able to determine, as this portion is so easily ruptured. However, in the examination of a large number of specimens, I have not found any conerescence of the mantle lobes between these parts. In *E. ensis* and *E. siliqua* the fourth aperture is situated more posteriorly, being about the centre of the ventral surface. There may be other genera with the orifice between these two positions, but up to the present none have come under my notice. From a morphological point of view, it is reasonable to infer that a portion of the pedal aperture first became specialised by developing a tentacular fringe; then this fringe extended posteriorly, and the pallial walls coalesced, separating the fourth from the pedal aperture, and finally the fourth aperture gradually proceeded further posteriorly, until it attained a position favourable for the function it originated for.

If either *S. ensis* or *E. siliqua* is examined, it will be seen that the fourth aperture is an elliptical opening bordered on both sides by a row of tentacles, those on the one side alternating with those on the other, that from it on the inside of each mantle lobe is a groove, and in these grooves lie the distal portions of the labial palps, the ends of them being near to the opening. The labial palps, and particularly the parts which form the lips, are of considerable length.

From experiments on *E. siliqua*, I observed that when particles of carmine were placed near the aperture they were gradually drawn in, the greater portion of them being passed between each pair of labial palps, and accumulated near the bases, just in the track where the food travels from the gills to the mouth. Now, as in all probability the labial palps assist the gills in rejecting objectionable matter, as well as being the medium by which the food is conveyed to the mouth, it appeared possible that the greater portion of the carmine would be detected and ejected by the exhalent aperture, and that is what happened. Nevertheless, I found a certain portion of the pigment had been passed anteriorly to this position, and

¹ Introduction à l'étude des mollusques.

some even near to the mouth itself. I am thus led to believe the fourth aperture is in some degree employed as an accessory food-providing organ. I also observed that the orifice was constantly used for the purpose of ejecting water and foreign matter from the pallial cavity, especially if through irritation the valves were suddenly closed, consequently I further think that in *E. siliqua* and *E. ensis* the fourth aperture acts in the dual capacity of an accessory food-providing organ, and an exhalent orifice for ejecting water or foreign matter, though the latter function is probably a secondary one. In *Lutraria elliptica* and *Thracia papyracea*, the fourth aperture is situated at the antero-ventral part of the mantle lobes. It is a small orifice, has no tentacular fringe, is surrounded by the very strongly developed muscles of the pallial edge, and is apparently under the control of the animal. The labial palps do not come near it, being situated in the anterior part, and the portion of the gills lying dorsally are a considerable distance away, so that the aperture is not in close communication with any other organ, as in *E. siliqua*. *Lutraria elliptica* used the aperture frequently in suddenly ejecting water or any objectionable matter from the pedal cavity. When particles of carmine were placed close to it, they were not drawn in, as in *E. siliqua*, the orifice only being used for ejecting water, &c., and evidently not as an accessory food-providing organ. The origin of the aperture is apparently of a different and more remote period than that of *E. siliqua*.

A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART VI*.)

BY G. K. GUDE, F.Z.S.

(Plate iii.)

xiii. MALAY ARCHIPELAGO.

The region now under consideration possesses one of the richest and most varied land molluscan faunas of the globe. The physical conditions are eminently favourable to molluscan life, while the splitting up of the region into innumerable islands has contributed to the formation of local races. The first naturalist to collect land shells here was Rumphius, who resided in Amboina, where he died in 1706; it was not, however, until the beginning of the nineteenth century that the mollusca began to be collected in a systematic manner. The first expedition was that of Baudin to Timor in 1800-1804, and subsequent voyages were made by Freycinet, Duperrey, Beechey, Dumond d'Urville, Vaillant, and Belcher, the results being published in the various works dealing with the respective expeditions.

*See ante, p. 165.

The next two important contributions are by Dr. A. R. Wallace and Professor E. von Martens, who visited many of the islands, whence they brought home a great number of novelties. The former naturalist published a check-list, the new species being described by Henry Adams ; while the latter gave his results in the publication of the Prussian Expedition to Eastern Asia. This work constitutes a veritable landmark in the malacology of the region, and forms the basis of all subsequent work in this branch of zoology. Beccari, Doria, and d'Albertis followed, while more recently Boek, Forbes, Weyers, Everett, Doherty, O. Strubell, Kukenthal, Weber, Semon, Ten Kate, Fruhstorfer, and Roebelen have further enriched our knowledge by the addition of new material. Mention must also be made of the sumptuous work on the Mollusca of Celebes by the Brothers Sarasin, who have contributed much to that portion of the fauna.

While looking over the collection of Malaysian land shells in the British Museum, Mr. Smith pointed out to me a few shells collected by Doherty, and others which had been purchased, which had not been worked out, and he kindly placed them at my disposal. Four appear to be undescribed, and I now append diagnoses and figures of them. Two others were at first believed to be new, and under this impression they were figured. I discovered subsequently that they were already described.

On glancing at the list of the Helicoids of the Eastern Archipelago, one is struck by the fact that as one goes eastwards the *Zonitidae*, which as far as number of species is concerned, at first preponderate, decrease and give way to the *Helicidae*, which thereupon, in their turn, outnumber the *Zonitidae*. The dividing line, roughly speaking, appears to be one separating Borneo from Celebes and the Moluccas. This, however, scarcely applies to the Lesser Sunda Islands east of Sumbawa. Of the *Zonitidae*, the genus *Dyakia* is confined to the Malay Peninsula, Sumatra, Java, and Borneo ; while *Nesta* is absent from Sumatra and Java ; for although I have doubtfully referred one Javan species (*dwi-paensis*) to *Nesta*, it will probably prove to pertain to *Lamprocystis*, or some allied genus. *Macrochlamys* is fairly general in distribution, but appears to be replaced in Borneo by *Everettia*, which reaches Buru through Celebes. *Hemiplecta* and *Trochomorpha* are distributed over the whole group. *Macrocycloides* has hitherto only been recorded from Borneo, Buru, Amboina, Haruku, and Saparua, being represented in each of these islands by one species. Of *Endodontidae* only one species is known in Java, and one in Celebes. Coming to the *Helicidae*, *Pseudobba* has two species each in Celebes and Sangir. *Planispira*, s.s., does not appear to occur west of Lombok and Celebes ; it has its centre of distribution in the Moluccas, and is replaced in the Aru Islands by the section *Cristigibba*, which forms a connecting link with the New Guinea fauna. *Trachia* occurs only (otherwise than on the Continent of Asia) in the Malay

Peninsula and Celebes, connecting the fauna with that of India and Burma. *Chloritis* is generally distributed, providing another connecting link with the mollusca of Further India on the one hand, and through the section *Sulcobasis* in the Aru Islands, with the fauna of New Guinea on the other. *Albersia* and *Papuina* range from the Moluccas through the Aru Islands into New Guinea. *Rhagada* is known only in Sumba, Dana, Flores, and Solor, its extra limital representatives being as far off as North Australia. *Amphidromus* (an arboreal genus of bright, conspicuous colouring), here finds its head-quarters, and occurs in most of the islands ; a few off-shoots occur in Further India. *Pseudopartula* is known only from Java, Sumatra, and Borneo. *Pyrochilus*, a small group, possessing four species, is confined to Halmaheira and Batchian. *Ganesella* is represented by a few species in Sumatra, Java, Borneo, and Celebes, forming another link with the fauna of the Continent of Asia. The presence of *Phoenicobius* and *Orthostylus* in Palawan and neighbouring islands connects the Bornean with the Philippine fauna, a connection still further evidenced by the occurrence of *Calocochlea* in Sangir and the Tukan Bessi group. *Crystallopsis* occurs in Buru, Goram, and the Aru Islands, thence ranging to the Solomon Islands. Lastly, *Pupisoma* is found in Penang, the Samui group, Borneo, Lombok, and Amboina, its remaining members occurring in India, Ceylon, Philippine Islands, and Japan.

In the following pages the faunas of the various islands are treated separately ; and for convenience of reference I have added an index to the islands ; also a Bibliography.

In concluding this series of papers on the Helicoid Land Shells of Asia, I take the opportunity of expressing my deep obligations to Mr. W. E. Collinge, Mr. H. Wallis Kew, Mr. John Ponsonby, and Mr. E. A. Smith for valuable assistance and suggestions.

A few new records of habitat based on specimens (from reliable sources) in my own collection are indicated by an asterisk.

Dyakia smithlania, n.sp.

Pl. iii, figs. 1a, 1b.

Shell sinistral, rimate, pyramidal, finely striated, the striae cut into granules by spirals, opaque, lustreless, pale straw-yellow ; spire elevated, apex acute, suture shallow. Whorls 6, flattened above, tumid below, increasing slowly at first, last whorl twice as wide as penultimate, subangulate at the periphery, not descending in front, slightly dilated towards the mouth. Two narrow dark brown bands revolve just below the suture, gradually disappearing upwards ; at the periphery occurs also a dark brown band, with a narrow, faint one immediately below it ; these two latter are only visible on the body whorl. Aperture oblique, subovate, margins subparallel ; peristome thin, straight, columellar margin slightly reflected over the narrow perforation of the umbilicus.

Diam. maj. 32, min. 29; alt. 25 millim.

Hab.—Sumatra. Type in the British Museum. (Purchased).

This handsome species is quite distinct from any known *Dyakia*, and I have much pleasure in associating with it the name of the courteous Assistant Keeper of Zoology of the British Museum, Mr. Edgar A. Smith.

***Planispira quadrifasciata*, L^a G. var. *halmaherica*, n.var.**

Pl. iii, figs. 2*a*, 2*b*, 2*c*.

Shell discoid, moderately umbilicated, dull yellowish, finely striated. Spire depressed, apex flattened, suture shallow. Whorls $4\frac{1}{2}$, rather convex above, rounded at the periphery, subangular round the umbilicus; last whorl shortly descending in front, dilated towards the mouth, crested and gibbous behind the peristome. Aperture oblique, subrotundate; margins approaching; peristome white, scarcely thickened, shortly reflected, bearing a slight tubercle on the columellar margin which is slightly dilated above, overhanging the deep funnel-shaped umbilicus. Three narrow dark brown bands revolve round the body whorl—one above and one below the periphery, the third round the umbilical angulation.

Diam. maj. 16.5, min. 13; alt. 7.5 millim.

Hab.—Dodinga, Halmaheira (Doherty).

***Chloritis unguiculina*, Mart.**

Pl. iii, figs. 4*a*, 4*b*, 4*c*.

Two specimens, measuring respectively $14 \times 12 \times 8.5$ and $13 \times 11 \times 7.5$ millim., labelled "Alor." (Doherty). Mr. Smith informs me, however, that he is not sure of the habitat. The species has hitherto only been recorded from Buru.

***Chloritis (Trichoehloritis) albodentata*, Smith.**

Pl. iii, fig. 7.

Planispira albodentata, Smith; Ann. and Mag. Nat. Hist., 1899 (7), iii, p. 411.

Hab.—South Flores, alt. 3,600 ft.

The species is now figured for the first time. The drawing has been made from the type in the British Museum.

***Chloritis (Trichoehloritis) tabularis*, n.sp.**

Pl. iii, figs. 5*a*, 5*b*, 5*c*.

Shell depressed conoid, light fulvous, finely striated, closely covered with hair-scars arranged in quincunx. Whorls 5, a little convex above, tumid below, rounded at the periphery, angular round the deep narrow umbilicus, increasing slowly, the last twice as wide as penultimate, not descending in front, scarcely dilated towards the mouth. Aperture nearly horizontal,

widely ear-shaped; margins distant, connected by a thin callus, sinuous in outline; peristome scarcely thickened, shortly reflected, columellar margin dilated above and reflected over the umbilicus.

Diam. maj. 20, min. 17; alt. 12 millim.

Hab.—Sumatra. (Purchased).

Thersites (Rhagada) supracostulata, Schepm.

Pl. iii, figs. 6a, 6b, 6c.

The bands in this species vary considerably. In a suite of several specimens in the British Museum, one has a broad peripheral band; in the others all the bands are linear. One specimen is pure white, bandless.

Hab.—Sumba (Everett).

Helicostyla (Calocochleas) talautana, n.sp.

Pl. iii, fig. 3.

Shell imperforate conoid, finely striated, decussated with microscopic spiral lines, the earlier whorls violaceous, the body-whorl straw yellow, or fuscous chestnut colour. Spire depressed, apex obtuse, suture rather shallow, margined. Whorls $4\frac{1}{2}$, convex; last whorl not descending in front. Aperture a little oblique, subrotundate; peristome fulvous rose edged with white, a little thickened, flattened and reflexed; margins convergent, connected by a thin callus, columellar margin widened and flattened. One specimen has a narrow brown peripheral band on the straw yellow body-whorl, a second is bandless; a third specimen shows a trace of a band on the fuscous chestnut body-whorl.

Diam. maj. 37, min. 30; alt. 31–34 millim.

Hab.—Talaut (Doherty),

This new species somewhat resembles *Helicostyla tukanensis*, Pfr., in outline, but it is considerably larger, and the aperture is less dilated; while the columellar margin is more vertical.

A. MALAY PENINSULA.

a. MALACCA.

Genus *TROCHONANINA*, MOUSS.

lychnia, Bens.

Genus *XESTA*, Alb.

malaccana, Pfr.

Genus *HEMIPLECTA*, Alb.

humphreysiana, Lea.

v. turbinata, Mart.

arguta, Pfr.

monozonalis, Lam. (?)

Genus *RHYSOTA*, Alb.

cymatium, Bens.

chevalieri, Soul.

Genus *DYAKIA*, G.-A.

lindstedti, Pfr.

amphidroma, Mart.

? = *balestrieriana*, Lea.

albersi, Mart.

= *janus*, Pfr. non Chemn.

Genus *VITRINA*, Gray.

heliciformis, Pfr.

= *ophiria*, Pfr.

Genus *PYRAMIDULA*, Fitz.

Section *PYRAMIDULA*, s.s.

umbonalis, Bens.
 tutulus, Bens.
 Genus CHLORITIS, Beck.
 Section TRICHOCHLORITIS, Pils.
 platytropis, Mdf.
 Genus AMPHIDROMUS, Alb.
 aureus v. leucoxantha, Mart.
 inversus, Müll.
 interruptus, Müll.
 Genus EULOTA, Hartm.
 similis, Fer.

b. SINGAPORE.

Genus TROCHONANINA, Mouss.
 lychnia, Bens.
 Genus HEMIPLECTA, Alb.
 striata, Gray.
 = naninoides, Bens.
 = isabella, H. & J.
 humphreysiana v. bifasciata,
 Mart.
 Genus DYAKIA, G.-A.
 amphidroma, Mart.
 Genus AMPHIDROMUS, Alb.
 aureus v. melanomma, Pfr.
 comes v. polymorpha, Can.
 mundus, Pfr.

c. RIOUW (OR RHIO).

Genus AMPHIDROMUS, Alb.
 aureus v. melanomma, Pfr.

d. JOHORE.

Genus HEMIPLECTA, Alb.
 humphreysiana v. complanata,
 Mart.

e. SALANG OR JUNK CEYLON.

Genus MACROCHLAMYS, Bens.
 resplendens, Phil.
 Genus DYAKIA, G.-A.
 salangana, Mart.
 Genus HEMIPLECTA, Alb.

striata, Gray.
 Genus HELICARION, Fér.
 praececellens, Mart.
 nucleatus, Stol.
 Genus TROCHOMORPHA, Alb.
 sculpticarina, Mart.
 castra, Bens.
 Genus AMPHIDROMUS, Alb.
 atricallosus, Gould.
 = eques, Pfr.

f. PERAK.

Genus EUPLECTA, Semp.
 bijuga, Stol.
 Genus XESTA, Alb.
 malaouyi, de Morg.
 Genus DYAKIA, G.-A.
 retrorsa, Gould.
 kintana, de Morg.
 = lahatensis, de Morg. (juv.)
 Genus MACROCHLAMYS, Bens.
 diadema, Dall.
 resplendens, Phil.
 staphoides, Stol.
 hatchongi, de Morg.
 jousoufi, de Morg.
 bartoni, de Morg.
 Genus MICROCYSTINA, Mörch.
 townsendiana, Nev.
 Genus HEMIPLECTA, Alb.
 striata v. leechi, de Morg.
 sakayana, de Morg.
 floweri, Smith.
 Genus APOFARMARION, Cllge.
 partridgei, Cllge.
 Genus PARAPARMARION, Cllge.
 elongatus, Cllge.
 Genus HELICARION, Fér.
 nucleatus, Stol.
 lineolatus, Mart.
 lowi, de Morg.
 permollis, Stol.
 Genus LAMPROCYSTIS, Pfr.
 malayana, Mdf.

- conulina, Mdff.
 Genus SITALA, H. Ad.
 carinifera, Stol.
 pataniensis, de Morg.
 Genus KALIELLA, W. T. Blanf.
 perakensis, Nev.
 Genus VITRINOPSIS, Semper.
 douvilliei, de Morg.
 (Gaeotis douvilliei, de Morg.)
 Genus TROCHOMORPHA, Alb.
 grubaueri, Mdff.
 timorensis, Mart.
 ? = thieroti, de Morg.
 swettenhami, de Morg.
 Genus PLANISPIRA, Beck.
 Sub-genus TRACHIA, Alb.
 penangensis, Stol.
 wrayi, de Morg.
 hardouini, de Morg.
 Genus CHLORITIS, Beck.
 Section TRICHOCHLORITIS, Pils.
 malayana, Mdff.
 breviseta, Pfr.
 Genus AMPHIDROMUS, Alb.
 aureus v. melanomma, Pfr.
 atricollosus, Gould.
 perakensis, Fult.
 sinensis, Bens. v.
 xiengensis, Mor.
 Genus GANESELLA, W. T. Blanf.
 perakensis, Crosse.
 v. subperakensis, Pils.
 bouryi, de Morg.
 Genus EULOTA, Hartm.
 similaris, Fér.

 g. PENANG.
 Genus EUPLECTA, Semp.
 bijuga, Stol.
 Genus MACROCHLAMYS, Bens.
 stephoides, Stol.
 resplendens, Phil.
 Genus RHYSSOTA, Alb.
 cymatium, Bens.

- Genus HEMIPLECTA, Alb.
 striata, Gray.
 Genus, HELICARION, Fér.
 nucleatus, Stol.
 permollis, Stol.
 Genus SITALA, H. Ad.
 carinifera, Stol.
 = Trochomorpha kusana, Aldr.
 Genus KALIELLA, W. T. Blanf.
 palmicola, Stol.
 Genus TROCHOMORPHA, Alb.
 castra, Bens.
 cantoriana, Bens.
 timorensis, Mart.
 Genus PLANISPIRA, Beck.
 Sub-genus TRACHIA, Alb.
 penangensis, Stol.
 Genus AMPHIDROMUS, Alb.
 atricollosus, Gould.
 aureus v. melanomma, Pfr.
 Genus EULOTA, Hartm.
 similaris, Fér.
 Genus PUPISOMA, Stol.
 orcella, Stol.

h. QUEDA OR KEDAH

- Genus XESTA, Alb.
 malaccana, Pfr.

i. PULO LANKAWA.

- Genus RHYSSOTA, Alb.
 cymatium, Bens.

j. KELANTAN (OR KALANTAN).

- Genus EUPLECTA, Semp.
 bijuga v. convexuspira, Mdff.
 Genus MACROCHLAMYS, Bens.
 stephoides, Stol.
 hardwickei v. kelantanensis,
 Mdff.
 Genus HEMIPLECTA, Alb.
 humphreysiana, Lea.
 Genus SITALA, H. Ad.

carinifera, Stol.
 subscalaris, Mdff.
 sublineolata, Mdff.

Genus *TROCHOMORPHA*, Alb.
 grubaueri, Mdff.
 kelantanensis, Mdff.
 castra, Bens.

Genus *CHLORITIS*, Beck.
 malayana, Mdff.

k. LIGEH (OR LIGOR?)
 Genus *GIRASIA*, Gray.
 peguensis, Theob.

l. NAWNG CHIK.
 Genus *CRYPTOSEMELUS*, Cllge.
 gracilis, Cllge.

m. JALOR.
 Genus *AMPHIDROMUS*, Alb.
 perversus, L.

B. SAMUI GROUP.

Genus *XESTA*, Alb.
 siamensis, Pfr.
 Genus *MACROCHLAMYS*, Bens.
 limbata, Mdff.
 Genus *HEMIPLECTA*, Alb.
 weinkauffiana v. inflata, Mdff.
 Genus *SITALA*, H. Ad.
 insularis, Mdff.

Genus *KALIELLA*, W. T. Blauf.
 subsculpta, Mdff.
 Genus *CHLORITIS*, Mdff.
 Section *TRICHOCHLORITIS*, Pils.
 platytropis v. samuiana, Mdff.
 Genus *AMPHIDROMUS*, Alb.
 moniliferus, Gould.
 Genus *PUPISOMA*, Stol.
 orcella, Stol.

C. SUMATRA.

Family **Zonitidae**.
 Sub-family **Macrochlaminae**.
 Genus *MACROCHLAMYS*, Bens.
 malaccana, Pfr.
 convoluta, Desh.
 = convallata v. rufofusca,
 Mart.
 aurea, Mart.
 Genus *MICROCYSTINA*, Mörch.
 infans, Pfr.
 Genus *HEMIPLECTA*, Alb.
 densa, A. & R.
 schumacheriana, Pfr.
 humphreysiana v. gemina, v.d.B.
 hoodjongensis, Smith.
 umbilicaris, Le G. v. suma-
 trana, Mart.
 = desgrazii, Hombr.
 arguta, Pfr.
 obliquata, Reeve.

monozonalis, Lam. (?)
 castanea, Müll.
 marangensis, Ald.
 Genus *DYAKIA*, G.-A.
 amphidroma, Mart.
 v. martini, Pfr.
 v. mackensiana, Soul.
 granaria, Bock.
 maarseveenii, Bock.
 smithiana, Gude.
 weyersi, Smith.
 rumphii, v.d. B.
 sumatrensis, Mouss.
 foveata, Pfr.
 Sub-family **Helicarioninae**.
 Genus *HELICARION*, Fér.
 bocki, Smith.
 lineolatus, Mart.
 sumatrensis, Schepm.
 Genus *SITALA*, H. Ad.

carinifera v. marangensis, Ald.

Sub-family **Zonitinae**.

Genus VITRINA, Gray.

heliciformis, Pfr.

hyalea, Bock.

Genus TROCHOMORPHA, Alb.

planorbis, Less.

bicolor, Mart.

costulata, Mart.

dohertyi, Ald.

Family **Helicidae**.

Group EPIPHALLOGONA, Pils.

Genus PLANISPIRA, Beck.¹

Sub-genus CRISTIGIBBA, Can.

quadrivolvus, Mart.

Sub-genus TRACHIA, Alb.

smithi, Bock.

Genus CHLORITIS, Beck.

Section TRICHOCHLORITIS, Pils.

crassula, Phil.

= störiana, Mouss.

tomentosa, Pfr.

tabularis, Gude.

Genus AMPHIDROMUS, Alb.

inversus, Müll.

porcellanus, Mouss.

sumatranus, Mart.

semifrenatus, Mart.

Sub-genus PSEUDOPARTULA, Pfr.

dohertyi, Aldr.

Genus GANESELLA, W. T. Blanf.

gysseriana, Pfr.

= conulus, Mart.

rufofilosa, Bock.

Group BELOGONA EUADENIA.

Genus PLECTOTROPIS, Mart.

winteriana, Pfr.

sumatrana, Mart.

DOUBTFUL RECORDS.

Trochonanina conus, Phil.

Patula cavernula, Smit.

a. BANCA.

Genus EVERETTIA, G.-A.

consul, Pfr.

Genus HEMIPLECTA, Alb.

umbilicaris, Le G. v. bankana,
Mart.

Genus DYAKIA, G.-A.

amphidroma, Mart. v. macken-
siana, Soul.

b. BILITON.

Genus AMPHIDROMUS, Alb.

aureus v. melanomma, Pfr.

c. BATU ARCHIPELAGO.

Genus HEMIPLECTA, Alb.

humphreysiana, Lea.

Genus DYAKIA, G.-A.

weyersi, Smith. Bodjo.

d. ENGANO.

Genus MACROCHLAMYS, Bens.

dohertyi, Hend.

Genus HELICARION, Fér.

albellus, Mart. var.

Genus TROCHOMORPHA, Alb.

hartmanni, Pfr.

Genus PLANISPIRA, Beck.

aldrichi, Hend.

Genus AMPHIDROMUS, Alb.

enganoensis, Fult.

D. JAVA.

Family **Zonitidae**.

Sub-family **Ariophantinae**.

Genus TROCHONANINA, Mouss.

conus, Phil.

multicarinata, Boettg.

Sub-family **Macrochlaminae**.

? Genus MACROCHLAMYS.

dwipaensis, Gude.

= jenynsi, Mart. non Pfr.

Genus MICROCYSTINA, Mörch.

- infans*, Pfr.
 Genus *HEMIPLECTA*, Alb.
 densa, A. & R.
 v. *herklotsiana*, Dohrn.
 v. *moussoniana*, Mart.
 v. *corrosa*, Mouss.
humphreysiana, Lea.
 v. *turbinata*, Mart.
 v. *complanata*, Mart.
 v. *gemina*, v.d. B.
 = *bifasciata*, Mart.
patens, Mart.
moussoni, Pfr.
rareguttata, Mouss.
inquinata, v.d. B.
umbilicaris, Le G. v. *sundana*,
 Mart.
 v. *virescens*, Mart.
centralis, Mouss.
arguta, Pfr.
bataviana, v.d. B.
 = *induta*, Pfr. (juv)
duplocincta, Mdff.
acuteccarinata, Mdff.
marginata, Mdff.
acelidota, Mdff.
 v. *robusta*, Mdff.
javana, Fér.
 = *javacensis*, Fér.
 = *javanica*, Lam.
 Genus *DYAKIA*, G.-A.
 regalis, Bens.
 = *vittata*, A. & R.
rumphii, v.d.B.
clypeus, Mouss.
 = v. *zollingeriana*, Mart.
 v. *jagoriana*, Mart.
ryssolemma, Alb.
 Sub-family **Helicarioninae**.
 Genus *HELICARION*, Fér.
 lineolatus, Mart.
 albellus, Mart.
 = *wonosariensis*, Mouss.
 agilis, Mart.
 adolphi, Boettg.
 perfragilis, Mdff.
 fruhstorferi, Mdff.
 Genus *PARMARION*, P. Fisch.
 reticulatus, Hasselt.
 taeniatus, Hasselt.
 pupillaris, Humb.
 v. *punctata*, Mart.
 v. *marmorata*, Mart.
 v. *vittata*, Mart.
 luteus, Mouss.
 planus, Mouss.
 weberi, Simr.
 Genus *MICROPARMARION*, Simr.
 austeni, Simr.
 fruhstorferi, Simr.
 boettgeri, Simr.
 javanica, Cllege.
 Genus *COLLINGEA*, Simr.
 strubelli, Simr.
 Genus *LAMPROCYSTIS*, Pfr.
 gedeana, Mdff.
 fruhstorferi, Mdff.
 circumlineata, Mdff.
 subglobosa, Mdff.
 exigua, Mdff.
 nana, Mdff.
 radiatula, Mdff.
 vitreiformis, Mdff.
 Genus *SITALA*, H. Ad.
 micula, Mouss.
 bandongensis, Boettg.
 javana, Mdff.
 Genus *KALIELLA*, W. T. Blauf.
 indifferens, Boettg.
 javana, Boettg.
 acutiuscula, Mdff.
 sitaliformis, Mdff.
 platyconus, Mdff.
 angigyra, Mdff.
 convexoconica, Mdff.
 amblia, Mdff.
 densetorta, Mdff.
 viridula, Mdff.

- macrostoma, Mdff.
 pisum, Mdff.
- Sub-family **Zonitinae**.
- Genus **TROCHOMORPHA**, Alb.
 planorbis, Less.
 v. javanica, Mouss.
 bicolor, Mart.
 hartmanni, Pfr. (?)
 tricolor, Mart.
 zollingeri, Pfr.
 concolor, Boettg.
 strubelli, Boettg.
- Family **Endodontidae**.
- Group **HAPLOGONA**, Pils.
- Genus **PYRAMIDULA**, Fitz.
 javana, Mdff.
- Family **Helicidae**.
- Group **EPIPHALLOGONA**, Pils.
- Genus **CHLORITIS**, Beck.
- Section **TRICHOCHLORITIS**, Pils.
 crassula, Phil.
 helicinoides, Mouss. non Hombr.
 = cryptopila, Mouss. in Coll.
 tetragyra, Mdff.
 fruhstorferi, Mdff.
- Genus **AMPHIDROMUS**, Alb.
 palaceus, Mouss.
 v. subaurantia, Fult.
 v. appressa, Mart.
 v. pura, Mouss.
 v. tener, Mart.
 winteri, Pfr.
 v. inauris, Fult.
 heerianus, Pfr.
 v. robusta, Fult.
 javanicus, Sowb.
 alticola, Fult.
 perversus, Linn.
 interruptus, Müll.
 v. emaciata, Mart.
 v. sultana, Lam.
 v. inflata, Fult.
 v. elongata, Fult.
 porcellanus, Mouss.
- filozonatus, Mouss.
 furcellatus, Mouss.
 = v. flammulata, Mart.
 v. virescens, Mart.
 elegans, Mouss.
- Sub-genus **PSEUDOPARTULA**, Pfr.
 galericulum, Mouss.
 v. gedeania, Pils.
 v. fasciata, Aue.
 v. impunctata, Anc.
- Genus **GANESELLA**, W. T. Blanf.
 bantamensis, Smith.
 BELOGONA EUADENIA, Pils.
- Genus **EULOTA**, Hartm.
 similis, Fér.
 v. subdepressa, Mart.
 v. solidula, Mouss.
 v. subsimilis, Mouss.
 transversalis, Mouss.
- Genus **PLECTOTROPIS**, Mart.
 rotatoria, v.d.B.
 winteriana, Pfr.
 sumatrana v. moussoniana, Mart.
 intumescens, Mart.
 huttoni, Pfr.
 = orbicula, Hutt. non Orb.
 smiruensis, Mouss.
 leucomphala, Mdff.
 epiplatia, Mdff.
 trichotrochium, Mdff.
 ciliocincta, Mdff.
 schepmani, Mdff.
- Genus **HELICOSTYLA**, Fér.
- Section **CRYSTALLOPSIS**, Anc.
 coelaxis, Pils.
 BELOGONA SIPHONADENIA, Pils.
- Genus **ACANTHINULA**, Beck.
 perpusilla, Mdff.
 tiluana, Mdff.
- DOUBTFUL OR SPURIOUS RECORDS.**
 Chloritis unguina, Fér.
 ,, unguicula, Fér.
 Crystallopis najas, Pfr.
 Helicostyla rustica, Mouss.

a. MADURA.

Genus *HEMIPLECTA*, Alb.*javana*, Fér.Genus *AMPHIDROMUS*, Alb.*filozonatus*, Mouss.Genus *EULOTA*, Hartm.*transversalis*, Mouss.Genus *PLECTOTROPIS*, Mart.*squamulosa*, Mouss.

b. BAWEAN.

Genus *HEMIPLECTA*, Alb.*bataviana*, v.d.B.Genus *AMPHIDROMUS*, Alb.*interruptus*, Müll.

c. POPOLI.

Genus *PLECTOTROPIS*, Mart.*rotatoria*, v.d.B.

d. PRINCE'S ISLAND.

Genus *AMPHIDROMUS*, Alb.*aureus*, Martyn.

e. KRAKATAO OR RAKATA.

Genus *HEMIPLECTA*, Alb.*umbilicaris*, Le G. v. *sumatrana*,

Mart

arguta, Pfr.Genus *CHLORITIS*, Beck.Section *TRICHOCHLORITIS*, Pils.*helicinoides*, Mouss.Genus *AMPHIDROMUS*, Alb.*inversus*, Müll.

f. PULO SUNGIAN (EILAND

DWARS IN DE WEG.)

Genus *HEMIPLECTA*, Alb.*virens*, Mart.Genus *DYAKIA*, G.-A.*amphidroma*, v. *martini*, Pfr.Genus *TROCHOMORPHA*, Alb.*bicolor*, Mart.Genus *AMPHIDROMUS*, Alb.*inversus*, Müll.

g. CHRISTMAS ISLAND.

Genus *LAMPROCYSTIS*, Pfr.*normani*, Smith.*mabelae*, Smith.*mildredae*, Smith.

E. BORNEO.

Family **Zonitidae.**Sub-family **Ariophantinae.**Genus *TROCHONANINA*, Mouss.*conicoides*, Metc.*v. parva*, Smith.*v. crenulata*, Mdff.*labuanensis*, Pfr.*tropidophora*, A. and R.*whiteheadi*, Smith.*heraclea*, Smith.Genus *XESTA*, Alb.*glutinosa*, Metc.*brotii*, Bonnet.*moluensis*, Smith.*padasensis*, Smith.*thisbe*, Smith.*baramensis*, Kob.Genus *EUPLECTA*, Semp.*bijuga*, Stol.Genus *XESTINA*, Semp.*themis*, Smith.Sub-family **Macrochlaminae.**Genus *EVERETTIA*, G.-A.*consul*, Pfr.*subconsul*, Smith.*cutteri*, H. Ad.*v. baramensis*, Kob.*jueunda*, Pfr.*v. nana*, G.-A.*hyalina*, Mart.*aglaia*, Pfr.*v. emarginata*, Nev.*cinnamomea*, Val.*subimperfiorata*, Smith.*planior*, Smith.*baramensis*, Smith.*thalia*, Smith.*bocki*, Issel.

Genus MICROCYSTINA, Mörch.

- infans, Pfr.
- tersa, Issel.
- macdougalli, Issel.
- lowi, Issel.
- perlucida, Issel.
- dyakana, G.-A.
- st. johni, G.-A.
- pudens, G.-A.
- seclusa, G.-A.
- cavernae, G.-A.

Genus RHYSOTA, Alb.

- brookei, A. and R.
- = gigas, Pfr.
- v. baramensis, Kob.
- borneensis, Pfr.

Genus HEMIPLECTA, Alb.

- densa, A. and R.
- v. atrofusca, Mart.
- buttikoferi, Schepm.
- schumacheriana, Pfr.
- obliquata, Reeve.
- souleyetiana, Pfr.
- donoyani, Pfr.
- nobilis, Pfr.
- arguta, Pfr.
- praeulta, Smith.
- rabongensis, Smith.

Genus DYAKIA, G.-A.

- regalis, Bens.
- v. unicolor, G.-A.
- janus, Chemn.
- lindstedti, Pfr.
- v. castanea, Smith.
- amphidroma, Mart.
- v. intermedia, Mart.
- mindaiensis, Bock.
- = sarawakana, Dohrn.
- = mendaiensis (Semp. !), Tenison-Woods.
- intradentata, G.-A.
- busauensis, G.-A. (em.).
- = busanensis, G.-A.
- v. concolor, Smith.

- moluensis, G.-A.
- subdebilis, Smith.
- densestriata, Schepm.

Genus MACROCYCLOIDES, Mart.

- obscurata, A. & R.

Sub-family **Helicarioninae.**

Genus HELICARION, Fér.

- borneensis, Pfr.
- whiteheadi, G.-A.
- semicalcareus, Schepm.

Genus PARMARION, P. Fisch.

- goedhuisi, Schepm.
- everetti, Cllge.
- intermedium, Cllge.

Genus MICROPARMARION, Simr.

- litteratus, Schepm.
- fultoni, Cllge.
- constrictus, Cllge.

Genus DAMAYANTIA, Issel.

- dilecta, Issel.
- carinata, Cllge.

Genus WIEGMANNIA, Cllge.

- dubia, Wieg.
- gigas, Cllge.
- ponsonbyi, Cllge.
- borneensis, Cllge.

Genus COLLINGEA, Simr.

- smithi, Cllge. and G.-A.
- (Damayantia smithi, C. and G.-A.)
- pollonerai, Cllge. and G.-A.
- simrothi, Cllge. and G.-A.

Genus ISSELENTIA, Cllge.

- plicata, Cllge.
- globosa, Cllge.

Genus IBYCUS, Heyn.

- beccarii, Issel.
- doriae, Issel.

Genus DURGELLA, G.-A.

- hosei, G.-A.

Genus SITALA, H. Ad.

- everetti, G.-A.
- singularis, G.-A.
- raricostulata, Smith.
- baritensis, Smith.

- moluensis, Smith.
 carinifera, Stol.
 = *Trochomorpha kusana*, Aldr.
 angulata, Issel.
 rumbangensis, Smith.
 demissa, Smith.
 cara, Smith.
 duleis, Smith.
 accepta, Smith.
 amussitata, Smith.
 inaequisculpta, Smith.
 Genus *KALIELLA*, W. T. Blanf.
 doliolum, Pfr.
 = *Sitala orchis*, G.-A.
 Sub-family **Zonitinae**.
 Genus *TROCHOMORPHIA*, Alb.
 planorbis, Less.
 v. *appropinquata*, Mart.
 v. *lessoni*, Mart.
 v. *nummus*, Issel.
 bicolor, Mart.
 metcalfei, Pfr.
 kinabaluensis, Smith.
 v. *pallida*, Smith.
 Family **Helicidae**.
 Group *EPIPHALLOGONA*, Pils.
 Genus *CAMAENA*, Alb.
 Section *PHOENICIBIUS*, Mörch.
 trailli, Pfr.
 Genus *PLANISPIRA*, Beck.
 dulcissima, Smith.
 Sub-genus *CRISTIGIBBA*, Can.
 quadrivolvis, Mart.
 Genus *CHLORITIS*, Beck.
 Section *CHLORITIS*, s.s.
 flexuosa, Pfr.
 latecostata, Kob.
 Section *TRICHOCHLORITIS*, Pils.
 everetti, H. Ad.
 tomentosa, Pfr.
 kinabaluensis, Smith.
 meander, G.-A.
 Genus *PAPUINA*, Mart.
 antiqua, A. and R.
- Genus *AMPHIDROMUS*, Alb.
 perversus, Linn.
 v. *similis*, Pils.
 = *atricullosa*, Schepm.
 interruptus, Müll.
 martensi, Boettg.
 inversus, Müll.
 hosei, Smith.
 adamsi, Reeve.
 v. *rufoineta*, Fult.
 v. *inornata*, Fult.
 v. *aureocincta*, Fult.
 v. *rubiginosa*, Fult.
 v. *placida*, Fult.
 v. *angulata*, Fult.
 pictus, Fult.
 v. *concinna*, Fult.
 v. *connectens* (Fult.)
 = *everetti* v. *connectens*, Fult.
 Sub-genus *PSEUDOPARTULA*, Pfr.
 nasuta, Mete.
 Genus *GANESELLA*, W. T. Blanf.
 niahensis, G.-A.
 subflava, G.-A.
 rufofilosa, Bock.
 BELOGONA EUADENIA, Pils.
 Genus *EULOTA*, Hartm.
 incauta, Smith.
 Genus *PLECTOTROPIS*, Mart.
 winteriana, Pfr.
 grumulus, G.-A.
 Genus *PUPISOMA*, Stol.
 pulvisculum, Issel.
 Genus *HELICOSTYLA*, Fér.
 Section *ORTHOSTYLUS*, Beck.
 satyrus v. *minima*, Pils.
 DOUBTFUL OR SPURIOUS RECORDS.
 Chloritis unguiculastra, Mart.
 Euhadra orientalis, Reeve.
 a. PALAWAN (OR PARAGUA).
 Family **Zonitidae**.
 Sub-family **Ariophantinae**.
 Genus *TROCHONANINA*, Mouss.

- paraguensis, Smith.
 v. eurystoma, Mdff.
 v. denselirata, Mdff.
 conicoides, Mete.
 v. subconvexa, Mdff.
- Sub-family **Macrochlaminae**.
 Genus **MACROCHLAMYS**, Bens.
 pseustes, Smith.
- Genus **MICROCYSTINA**, Mörch.
 st. johni, G.-A.
- Genus **HEMIPLECTA**, Alb.
 densa, A. and R.
 v. everetti, Smith.
 schumacheriana, Pfr.
 egeria, Smith.
- Sub-family **Helicarioninae**.
 Genus **LAMPROCYSTIS**, Pfr.
 goniogyra, Mdff.
 succinea, Pfr.
 myops, D. and S.
 chlororaphe, Smith.
- Genus **SITALA**, H. Ad.
 baritensis, Smith.
- Genus **KALIELLA**, W. T. Blanf.
 accepta (Smith), Mdff.
 (Sitala accepta, Smith).
 infantilis (Smith), Mdff.
 (Sitala infantilis, Smith).
- Genus **HEMITRICHIA**, Mdff.
 plateni, Dohrn.
- Sub-family **Zonitinae**.
 Genus **TROCHOMORPHA**, Alb.
 loocensis, Hid.
 boholensis, Semp.
 metcalfei, Pfr.
 repanda, Mdff.
 splendens, Semp.
 pseudosericea, Boettg.
- Family **Helicidae**.
 Group **EPIPIHALLOGONA**, Pils.
 Genus **CAMAENA**, Alb.
 stolidota, Q. and M.
- Section **PHOENICOBIUS**, Mörch.
 trailli, Pfr.
 v. turrita, Mdff.
 monochroa, Sowb.
 palawanica, Pfr.
 = doriae, Dohrn.
 = sauliae, Rve.
 v. albolabiata, Mdff.
 v. fulva, Mdff.
 v. fuscilabiata, Mdff.
 v. confusa, Mdff.
 v. fusca, Mdff.
 sauliae, Pfr. (Murigi Island.)
 = palumba, Souv.
 lagunae, Hid.
 v. gigas, Mdff.
 egregia, Desh.
 avus, Pfr.
- Genus **OBBA**, Beck.
 Sub-genus **OREOBBA**, Pils.
 camelus, Pfr. (Bakuit Island).
- Genus **CHLORITIS**, Beck.
 Section **TRICHOCHLORITIS**, Pils.
 inquieta, Dohrn.
- Genus **AMPHIDROMUS**, Alb.
 entobaptus, Dohrn.
 v. gracilis, Fult.
 v. contracta, Mdff.
 quadrasi v. solida, Fult.
 v. everetti, Fult.
- BELOGONA EUADENIA**, Pils.
 Genus **EULOTA**, Hartm.
 fodiens, Pfr.
- Genus **HELICOSTYLA**, Fér.
 Section **ORTHOSTYLUS**, Beck.
 satyrus, Brod.
 v. palawanensis, Pfr.
 v. cyanocephala, Pils.
 v. cinerosa, Pfr.
 v. librosa, Pfr.
- b. **BALABAC**.
- Genus **TROCHONANINA**, Mouss.
 labuanensis, Pfr.
 paraguensis, Smith.
- Genus **LAMPROCYSTIS**, Pfr.

myops, Dohrn.
 goniogyra, Mdff.
 succinea, Mdff.
 discoidea, Q. and M.
 = balabacensis, Smith.
 Genus CAMAENA, Alb.
 Section PHOENICOBIVS, Mörch.
 monochroa, Sowb.
 lagunae, Hid.
 Genus AMPHIDROMUS, Alb.
 quadrası v. versicolor, Fult.
 v. dubia, Fult.
 Genus HELICOSTYLA, Fér.
 Section CORASIA, Alb.
 samboanga, H. and J.

c. MANGSI. (BALABAC STRAITS.)

Genus AMPHIDROMUS, Alb.
 adamsi v. mangsiana, Pils.
 Genus HELICOSTYLA, Fér.
 Section CORASIA, Alb.
 samboanga v. intaminata, Gld.
 Section ORTHOSTYLUS, Beck.
 satyrus v. graellsı, Hid.

d. PANALINGOAN. (S.W. OF
 PALAWAN.)

Genus CHLORITIS, Beck.
 Section TRICHOCHLORITIS, Pils.
 euphrosyne, Smith.

e. BUSUANGA. (N. OF PALAWAN.)

Genus CAMAENA, Alb.
 Section PHOENICOBIVS, Mörch.
 monochroa, Sowb.
 Genus HELICOSTYLA, Fér.
 Section ORTHOSTYLUS, Beck.
 satyrus, Brod.

f. BANGUEY.

Genus TROCHONANINA, Mouss.
 alexis, Smith.
 Genus EVERETTIA, G.-A.

subconsul, Smith.
 (also Mengalun Island).
 banguyensis, Smith.
 Genus HEMIPLECTA, Alb.
 obliquata, Reeve.
 Genus DYAKIA, G.-A.
 lindstedti, Pfr.
 Genus LAMPROCYSTIS, Pfr.
 myops, Dohrn.
 Genus CHLORITIS, Beck.
 Section TRICHOCHLORITIS, Pils.
 tomentosa v. major, Smith.
 Genus AMPHIDROMUS, Alb.
 adamsi, Reeve.
 v. subunicolor, Fult.
 v. articulata, Fult.
 v. simplex, Fult.
 v. ornata, Fult.
 v. luteofasciata, Fult.
 v. superba, Fult.
 quadrası, Hid.
 Genus HELICOSTYLA, Fér.
 Section ORTHOSTYLUS, Beck.
 satyrus, Brod.

g. SULU GROUP.
 1. SIBUTU.

Genus TROCHONANINA, Mouss.
 sylvana, S. and D.
 bongaoensis, Smith.
 = conicoides v. crenulata,
 Mdff.
 Genus MACROCHLAMYS, Bens.
 angulata, Mdff.
 Genus LAMPROCYSTIS, Pfr.
 myops, Dohrn.
 Genus KALIELLA, W. T. Blanf.
 doliolum, Pfr.
 = Sitala orchis, G.-A.
 Genus TROCHOMORPHA, Alb.
 metcalfei, Pfr.
 Genus OBBA, Beck.
 marginata, Müll.
 v. nana, Mdff.

Genus *CHLORITIS*, Beck.

Section *TRICHOCHLORITIS*, Pils.
sibutuensis, Smith.

Genus *PLECTOTROPIS*, Mart.
squamulifera, Mdff.

Genus *HELICOSTYLA*, Fér.

Section *CORASIA*, Alb.
samboanga, H. and J.
 = *aegrota* v. *zonata*, Smith.

2. BILATAN.

Genus *LAMPROCYSTIS*, Pfr.
myops, Dohrn.

Genus *TROCHOMORPHA*, Alb.
metcalfei, Pfr.

Genus *AMPHIDROMUS*, Alb.
roeseleri, Mdff.
 = *maculiferus*, v. Smith.

Genus *HELICOSTYLA*, Fér.

Section *HYPSELOSTYLA*, Mart.
camelopardalis, v. *boholensis*,
 Brod.

3. TAWI-TAWI.

Genus *MACROCHLAMYS*, Bens.
angulata, Mdff.

Genus *TROCHOMORPHA*, Alb.
metcalfei, Pfr.

4. BONGAO.

Genus *TROCHONANINA*, Mouss.
conicoides, Metc.
sylvana D. and S.
bongaoensis, Smith.

Genus *MACROCHLAMYS*, Beus.
angulata, Mdff.

Genus *MICROCYSTINA*, Mörch.
pseudosuccinea, Mdff.
gemma, Mdff.

Genus *TROCHOMORPHA*, Alb.
metcalfei, Pfr.

Genus *PLECTOTROPIS*, Mart.
squamulifera, Mdff.

5. SULU ISLAND.

Genus *MACROCHLAMYS*, Bens.
angulata v. *dimidiata*, Mdff.

Genus *TROCHOMORPHA*, Alb.
sylvana, S. and D.

Genus *OBBA*, Beck.
marginata, Müll.
 v. *nana*, Mdff.

Genus *CHLORITIS*, Beck.

Section *TRICHOCHLORITIS*, Pils.
suluana, Mdff.

Genus *AMPHIDROMUS*, Alb.
roeseleri, Mdff.

h. LABUAN.

Genus *TROCHONANINA*, Mouss.
labuanensis, Pfr.
conicoides, Metc.

Genus *XESTA*, Alb.
decrespignyi, Higg.
 v. *pallide-fasciata*, G.-A.

Genus *EVERETTIA*, G.-A.
jucunda, Pfr.
consul, Pfr.

Genus *HEMPLECTA*, Alb.
densa, v. *ignobilis*, Mart.
 v. *lowiana*, Mart.

Genus *DYAKIA*, G.-A.
hugonis, Pfr.

Genus *KALIELLA*, W. T. Blanf.
doliolum, Pfr.
 = *Sitala orchis*, G.-A.

Genus *TROCHOMORPHA*, Alb.
planorbis v. *lessoni*, Mart.
ceroconus, Pfr.

Genus *CHLORITIS*, Beck.

Section *TRICHOCHLORITIS*, Pils.
tomentosa, Pfr.
plena, G.-A.

Genus *AMPHIDROMUS*, Alb.
adamsi v. *hamata*, Fult.

Genus *PLECTOTROPIS*, Mart.
pudica, G.-A.

i. TIGA.

Genus EVERETTIA, G.-A.

jucunda, G.-A.

Genus LAMPROCYSTIS, Pfr.

chlororaphe, Smith.

Genus GANESELLA, W. T. Blanf.

tigaensis, G.-A.

j. KAREMON (OR KARAMON).

Genus EVERETTIA, G.-A.

consul v. rufa, G.-A.

Genus CHLORITIS, Beck.

Section TRICHOCHLORITIS, Pils.

tomentosa, Pfr. banded var. G.-A.

k. PULO LAUT.

Genus DYAKIA, G.-A.

amphidroma v. mackensiana,
Mart.

mindaiensis, Bock.

Genus PARMARION, H. P. Fisch.

dohertyi, G.-A.

l. NATUNA GROUP.

1. GREAT NATUNA (or Bunguran).

Genus TROCHONAXINA, Mouss.

affinis, Smith.

bunguranensis, Smith.

Genus EVERETTIA, G.-A.

cinnamomea, Val.

Genus MICROCYSTINA, Möreh.

bunguranensis, Smith.

Genus HEMIPLECTA, Alb.

humphreysiana, Lea.

Genus DYAKIA, G.-A.

hugonis, Pfr.

Genus SITALA, H. Ad.

carinifera, Stol.

baritensis, Smith.

Genus TROCHOMORPHA, Alb.

natunensis, Smith.

Genus ENDODONTA, Alb.

Sub-genus CHAROPA, Alb.

perculpta, Smith.

Genus AMPHIDROMUS., Alb.

aureus v. natunensis Fult.

2. SIRHASSEN.

Genus TROCHONAXINA, Mouss.
affinis, Smith.

Genus EVERETTIA, G.-A.

cinnamomea, Val.

Genus HEMIPLECTA, Alb.

humphreysiana, Lea.

Genus SITALA, H. Ad.

sirhasсенensis, Smith.

Genus TROCHOMORPHA, Alb.

natunensis, Smith.

To be concluded.

ON A NEW GENUS AND SPECIES OF THE FAMILY PHENACOHELICIDAE.

By HENRY SUTER.

(Plate iv.)

Ranfurlya constanceae, gen. et sp. nov.

Pl. iv, figs. 1—5.

Spirit Specimen : Animal (Figs. 1—2) limaciform, minute, black all over, with a subcentral visceral hump, the greater part of the viscera protected by a shell, which in turn is partly covered by the mantle. Most likely in the living animal the mantle covers the whole of the shell. All the tentacles are retracted. Neck, sides, and tail rugose, three longitudinal grooves on the neck ; mantle smooth, minutely punctured. Sole un-

divided, with slight transverse rugae, separated from the foot by a double pedal line. Genital orifice behind the right tentacles; pulmonary orifice on the right anterior side of the mantle, ending in a short distal slit; anal orifice on the right side just below the middle of the visceral hump. Tail rounded, with a caudal pore.

Total length 6, height 3, height of neck 1.75 millim.

Visceral hump: length 4.5, height 2, breadth 2.5 millim.

Breadth of sole 1.5 millim.

Shell (Fig. 3) auriform, yellowish-horny, flexible, membranaceous, transparent, with a notch on the right posterior side; one whorl only, with microscopical distant lines of growth.

Length 2.75, breadth 1.6 millim.

Jaw (Fig. 4) arcuate, delicate, composed of 15 very thin vertical laminae, all of which are separated from one another.

Radula (Fig. 5) elongated tongue-shaped, consisting of about 150 straight transverse rows of teeth, the formula being 13-7-1-7-13. The last marginal tooth is a minute plate with a rudimentary denticle; in the two following teeth the denticles still coalesce, but show beginning division. The base of attachment in most of the marginals is much broader than high. On the 17th tooth the division into distinct teeth begins; the ectocone is always smallest, sometimes bidentate, the mesocone is the stoutest, and the entocone is more slender, and slightly directed towards the centre of the radula. A few quadrate transition teeth occur between the marginal and lateral teeth, on which the ectocone is minute, the mesocone large, reaching to the posterior margin of the base, and the entocone about twice the size of the ectocone. The laterals have a square base, higher than broad, and are tricuspid. The mesodont reaches a little beyond the posterior margin of the base, the side-cusps are short and with minute cutting points. The central tooth is exactly like the mesial laterals.

On dissecting the minute animal, I found it to be in a rather bad condition for the purpose, but I fully satisfied myself that it was immature. I hope that further search for this slug will provide adult specimens, when the anatomy can be properly worked out.

Hab.—Auckland Islands, where it was found by Lady Constance Knox, who handed it over to the Hon. H. C. Butler, and by whom it was given to Capt. F. W. Hutton. The latter, with his usual kindness and liberality, kindly sent me the unique specimen for description, for which my best thanks are due to him.

The genus is named, by kind permission, in honour of his Excellency the Earl of Ranfurly, K.C.M.G., etc., Governor of New Zealand, and the species in honour of his Excellency's daughter, Lady Constance Knox.

According to the facts brought forward, there can be no doubt about the systematic position of this slug; the presence of a caudal pore, the

jaw composed of numerous laminae, and the characters of the teeth of the radula clearly prove that it must be included in the family *Phenacohelcidae*.

Ranfurlya stands in the same relation to *Flammulina*, as *Schizoglossa* does to *Paryphanta*.

Type in my collection.

New Zealand, Auckland, May, 1903.

EXPLANATION OF PLATE IV.

Figs. 1, 2.	<i>Ranfurlya constanceae</i> .	Animal, magnified 10 times.
Fig. 3.	" "	Shell " " "
Fig. 4.	" "	Jaw, greatly magnified.
Fig. 5.	" "	Teeth of radula, magnified 720 times.

DESCRIPTIONS OF NEW LAND SHELLS FROM THE AUSTRO-MALAYAN REGION.

By E. R. SYKES, B.A., F.L.S.

Illustrations of the species herein described will be given later. All the "types," except that of *Helicina varians*, which is in my collection, are in the British Museum.

***Xesta sulcatula*, n.sp.**

Shell depressed-conoid, thin, narrowly perforate; sculpture microscopic spiral lines above and below, crossing the faint lines of growth. Colour yellowish-green, slightly paler above, with a chestnut line above the suture. Whorls 5, plano-convex, regularly increasing. Mouth lunate; lip thin except for a slight reflexion at its columellar junction, a very thin callus joining the margins.

Alt. 14; diam. max. 22.5 millim.

Hab.—Obi.

***Planispira (Cristigibba) albopieta*, n.sp.**

Shell openly umbilicated, planorbiform, with the spire a little sunken in the middle, thin, translucent, light brown above, and generally paler below, with a dark zone at the periphery, a white zone just below, and several other white zones (generally interrupted) both above and below; the colour pattern does not pass the constriction behind the lip. Whorls $4\frac{1}{2}$, regularly increasing, with a well-marked suture, the last whorl descending, with a well-marked "crest" and corresponding depression behind the lip. Mouth ovate, somewhat oblique, with the lip white, expanded and reflexed.

Alt. 8.5; diam. max. 19 millim.

Hab.—Halmahera ; a more polished and shining form from Obi. Noteworthy for its colour pattern, consisting of a dark brown peripheral band, and the other white zones, which are usually interrupted.

***Papuina callosa*, n.sp.**

Shell trochiform, yellow-brown, either unicolorous or with a dark chestnut band at the periphery and below the suture on the last whorl, this colouring also being exhibited by the somewhat mamillate protoconch ; sculpture well-marked lines of growth and minute granulations, the protoconch having faint radiating striae. Whorls $5\frac{1}{2}$, flattened, the last whorl descending a little, being flattened on the base, acutely keeled at the periphery, and somewhat compressed behind the mouth. Mouth sub-quadrate, the lip reflected and expanded, especially on the lower and columellar margins, where it is thickened also internally, and the columellar margin is furnished (generally) with a broad flattened callosity ; the lower margin is slightly impressed from below, producing the effect of an obscure denticle in the middle. The lip is well expanded over the umbilical region, and is purplish-brown in colour, becoming darker at the edges.

Alt. 16.5 ; diam. max. 27 millim.

Hab.—Halmahera.

***Papuina wallaceana*, n.sp. (*P. aurora* var. b.)**

Shell large, thin, depressed-conoid, moderately umbilicate, the umbilicus being partly concealed by the reflected columellar margin of the lip ; slightly compressed on the base ; sculpture consisting only of lines of growth, which give a roughened appearance to the shell ; protoconch small. Colour yellow-brown, with (in the type) six narrow blackish-chestnut bands, one at the periphery, two above, and three below ; other specimens lack the bands of colour. Whorls $5\frac{1}{2}$, slightly convex, with the suture well marked, last whorl a little descending. Mouth sub-ovate, with a lilac peristome, which is reflexed, expanded, and slightly thickened, especially below ; columellar margin well reflected over the umbilicus.

Alt. 21 ; diam. max. 36 millim.

Hab.—Waigiou.

Recalling in colour of shell and lip the unlocalised *P. pennantiana*, but lacks the acute carination of that species ; in shape it resembles a depressed *P. multizona* ! much larger than *P. aurora*.

***Papuina pyrgus*, n.sp.**

Shell perforate, the perforation being nearly covered by the reflexed columellar lip, solid, conical ; sculpture, well-marked lines of growth ; colour olivaceous ; spire moderately elongated ; protoconch large and smooth. Whorls 7, plano-convex, a trifle concave above the sutures, the last whorl not descending, acutely keeled, with the base flattened. Aper-

ture sub-triangular, with the peristome well expanded and reflexed, white, the outer margin sinuous, the basal margin slightly arched, and the columellar margin reflexed over the umbilical region, and furnished with a small tooth.

Alt. 30 ; diam. max. 35.5 millim.

Hab.—Waigiou.

Nearly related to *P. turris*, H. Ad., but more depressed, the cone not being so acute angled.

***Leptopoma diplochilus*, n.sp.**

Shell very similar in shape to a somewhat depressed form of *L. vitreum*, and densely, microscopically, spirally striated. Colour pale lilac, with narrow darker spiral lines (fourteen on the last whorl). Lip double, the outer portion very largely expanded and flattened, with thin edges, sinuate on the columellar margin ; the inner portion strongly projected forward, slightly on the inner, but largely on the outer margin, where it projects 2.5 millim.

Alt. 14 ; diam. max. 15 millim.

Hab.—Waigiou.

This remarkable shell is unlike any other species of *Leptopoma* known to me, owing to the presence of a double lip, with the " inner tube " strongly drawn out, and recalling some forms of *Cyclophorus*.

***Leptopoma (Leucoptychia) lamellatum*, n.sp.**

Shell moderately umbilicated, thin, pellucid, turbinate, white, either plain or flecked with red, or white on the last whorl with red upper whorls, or banded (in one specimen) with dark brown, protoconch moderately sharp ; sculpture spiral lirae, on the last whorl there is one at the periphery and five above ; microscopic spiral striation is also present ; the last half of the last whorl is marked by about twelve strong lamellae, stronger than and cutting the spiral lirae. Whorls $5\frac{1}{2}$, moderately convex. Mouth rounded, with the lip thickened and reflected, white, continuous. Operculum thin, horny, multispiral.

Alt. 16 ; diam. max. 16 millim.

Hab.—Waigiou.

Closely related to *L. scalare*, Ad., but much larger and slightly more depressed. Some specimens are larger than the actual type.

***Palaina ponsonbyi*, n.sp.**

Shell ovate-conic, rimate, white, faintly tinted with yellow ; protoconch moderately blunt and smooth, the other whorls densely sculptured with closely-set irregular lirae ; those on the last whorl being far more distant than the others. Suture well impressed. Whorls 7, convex, the penultimate the broadest, and the last whorl being compressed and slightly flat-

tened above the junction with the peristome. Mouth nearly round; lip double, the outer portion being moderately expanded, except where the adnate peristome joins the last whorl.

Alt. 4.8; diam. max. 2.2 millim.

Hab.—Waigiou.

***Omphalotropis waigiouensis*, n.sp.**

Shell ovately conic, thin, rimate; sculpture closely set fine lines of growth; protoconch blunt. Colour white or pale yellow. Whorls $5\frac{1}{2}$, convex, suture well impressed, the last whorl measuring nearly $\frac{3}{4}$ of the altitude of the shell. Mouth ovate, lip slightly incrassate and reflexed in the umbilical region, with a light callus joining the margins.

Alt. 4.8; diam. max. 3.3. millim.

Hab.—Waigiou.

Recalling, in form, *O. granum*, Pfr.

***Helicina varians*, n.sp.**

Shell thin, depressed conoid; sculpture none except closely set lines of growth. Colour in the type specimen yellow, with a reddish-brown band above the periphery; other specimens are uniform yellow, without any banding; or with radiating red-brown streaks, with or without banding, and varying ground colour. Whorls $4\frac{1}{2}$, flattened but slightly convex, periphery acutely keeled. Mouth triangular, lip white, lightly reflexed, and subdentate near the junction of the lower margin with the body whorl; a light callus joins the margins.

Alt. 7; diam. max. 11 millim.

Hab.—Santa Cruz Islands.

Belonging to the group of *H. suprafasciata*, but lacks the spiral sculpture on the upper surface.

NOTES.

A New Irish Vertigo.—The occurrence of a living example of *Vertigo heldi*, Clessin, near Ballintoy, Co. Antrim, is recorded by Mr. B. Tomlin (Irish Nat., 1903, vol. xii, p. 110). Dr. Boettger, who has seen the specimen, considers *V. heldi* as a sub-species of *V. alpestris*. It differs, however, from this latter species in the possession of an additional whorl, and general larger dimensions, it is reddish-brown in colour, has a feeble dentition, and a differently shaped mouth.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xv. (pt. 59), pp. 129-208, pl. 3-4a—55. Philadelphia : Academy of Natural Sciences.

Dr. Pilsbry continues the list of species of *Urocoptis* of Jamaica. Following this the undermentioned subgenera and sections are dealt with, viz.,

Sub-genus *Autocoptis*, Pils., dealing with the Haitian forms. Type *U. monilifera*, Pfr. Subgenus *Arangia*, Pils. & Van. Type *U. sowerbyana* Pfr. The variety *montetoronis* is new. Sub-genus *Idiostemma*, Pils. and Van. Type *U. uncata*, Gundl. Section *Maceo*, P. and V. Type and sole species *U. interrupta*, Gundl. Sub-genus *Cochlodinella*, P. and V. Type *U. poeyana*, Orb. The variety *lacteoeflua* from Cuba, is new. Sub-genus *Gongylostoma*, Albers. Type *U. elegans*, Pfr. A key to the following sections is then given : *Fibricutis*, Pils., *Sectilumen*, P. and V., *Esochara*, P. and V., *Pycnoptychia*, P. and V., *Paracallonia*, Pils., *Callonia*, Cr. and Fisch., *Liocalonia*, Pils. *U. humboldtiana*, Pfr. variety *peraffinis* is a new variety from Western Cuba. It is similar to *U. humboldtiana*, but somewhat more solid, less shining, and the striae are widely spaced, especially on the spire. *U. oligomesus* is a new species from Cuba. It is near to *U. saxosa*, Poey, but differs from that species chiefly by the much reduced median axial lamella.

Blanford, W. T.—Notes on Mr. W. M. Daly's collections of Land and Fresh-water Mollusca from Siam. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 274—284, pl. viii.

Dr. Blanford enumerates forty species of which the following are new, *Ampullaria dalyi*, *Melania binodosa*, and *Paludomus siamensis*.

Kobelt, W. and Mollendorff, O. von.—Catalog der Familie *Buliminidae*. Nachr. d. Deutsch. Malak. Gesell., 1903, pp. 36—66.

Dimon, A. C.—Quantitative study of the effect of Environment upon the forms of *Nassa obsoleta* and *trivittata* from Cold Spring Harbour, Long Island. Biometrika, 1902, vol. ii, pp. 24—43.

The authoress has studied in some detail the variation and correlation of these two species of *Nassa*. She discusses the influence of density and stillness of the water on depauperization.

Hoyle, W. E.—Notes on the Type Specimen of *Loligo eblanae*, Ball. Mem. and Proc. Manchester Lit. and Phil. Soc., 1903, vol. 47, No. 9, pp. 10, i pl.

A result of an examination of the type of this Cephalopod, described by Robert Ball in 1841, Mr. Hoyle confirms the opinion, which had been formed by others as well as himself, that this species is not distinguishable from the *Todaropsis veranyi* of Girard. The distinctive characters of the genus are given, and of the Irish specimen as fully as its state of preservation permits, accompanied by figures of some of the more critical parts, also a table of the synonymy, with references to the descriptions and figures.

Pace, S.—On the Anatomy of the Prosobranch genus *Pontiothauma*, E. A. Smith. Journ. Linn. Soc. (Zool.), 1903, vol. xxviii, pp. 455—462, pl. 42.

From an examination of the type specimens of this genus, Mr. Pace concludes that the affinities are with the *Mangilinae*; but so little is known as

to the anatomy of other allied forms, that at present it is impossible to assign the two known species of *Pontiothauma* to any precise position in the sub-family. It would, however, appear that their nearest allies are *Pleurotomella*, Verrill, and *Spergo*, Dall. The author is of opinion that the structure of the soft parts of *P. abyssicola*, E. A. Sm., justify its removal from the genus, but before proposing another new name, thinks it advisable to wait until further details are forthcoming regarding *Pleurotomella*, etc. It seems a great pity that a valuable morphological paper, such as this, could not have been better illustrated.

Marshall, J. T.—Additions to "British Conchology." Part VII. Pp. 59. Torquay: 1903.

This paper is a continuation of the series of papers which, under this title, have been appearing since October, 1893, in the Journal of Conchology. The author details numerous interesting facts and observations upon the distribution, size, nomenclature, and variation of the British marine mollusca. The following varieties are described as new:—*Cerithiopsis barleei*, Jeffr., var. *interrupta*, *Clathurella anceps*, Eichw., var. *soluta*, *C. linearis*, Mont., var. *minor*, *Pleurotoma brachystoma*, Phil., var. *alba*, *Pholas candida*, var. *cylindracea* and *Lacuna pallidula* var. *imperfurata*.

Glamann, G.—Anatomisch-systematische Beiträge zur Kenntniss der Tracheopulmonaten. Zool. Jahrb. (Abth. f. Morph.), 1903, Bd. 17, pp. 679—762, Tafn. 29—34.

Dr. Glamann gives a detailed account of the anatomy of *Aneitella virgata*, E. A. Sm., and compares the genus with other Tracheopulmonata, so far as their internal structure is known. The kidney of *Aneitella* is dealt with in great detail, and compared with that in *Aneitea*.

Walker, Bryant and Pilsbry, H. A.—The Mollusca of the Mt. Mitchell Region, North Carolina. Proc. Acad. Nat. Sci. Phila., 1902, pp. 413—442, pls. xxiv, xxv.

This is a report based upon material collected in the summer of 1901. The expedition was undertaken primarily for the purpose of exploring Mt. Mitchell, the highest peak of the Appalachian range, with an altitude of 6,711 feet, of whose fauna nothing was known except a few species collected by Hemphill in a hurried visit nearly twenty years ago. In all 59 species or sub-species are recorded, of which the following are new: *Polygyra tridentata* v. *tennesseensis*, *P. andreusae* subsp. *intermedia*, *Vitrea approxima*, *V. vanattai*, *Gastrodonta gularis* subsp. *theloides* and *decussata* (Pils. and Van.). The only species peculiar to Mt. Mitchell, re-discovered on the present expedition, seems to be the rare little *Vitrea clingmani*, Dall.

Pallary, P.—Apport a la faune malacologique de l'Arabie et de l'Égypte. Bull. de l'Inst. Égyptien, 1901, pp. 1—8, pl.

The following new species are described and figured: *Leucochroa arabica*, *Helix (Eremina) fourtaui*, *Limnaea sikenbergeri*, *Valvata innesi*, and *Pseudamnicola sinaica*.

Pallary, P.—Mollusques recueillis par le Dr. Innes Bey dans le Haut-Nil. Ibid., 1902, pp. 1—14, pls. i, ii.

The author records twenty-four species, of which the following are new: *Lanistes innesi*, *Corbicula artini*, *Unio fourtaui*, *Spathella fourtaui*, and *Spatha innesi*.

Pilsbry, Henry A.—The Land Mollusca from Japan and the Bonin Islands. Proc. Acad. Nat. Sci. Phila., 1902, pp. 25—32.

Dr. Pilsbry has in preparation a monographic account of the non-marine mollusca of the Bonin Islands, in which the undermentioned species will be figured; in the meantime it is thought desirable to publish brief notices of Mr. Nakada's discoveries (who is still collecting there). Of the genus *Helicina*, Lam., the following new species are indicated: *H. capsula*, *H. ogasawarana*, *H. hirasei*, *H. yoshiwarana* and vars. *arata* and *microtheca*. Descriptions are given of *Alycaeus biexcisus* from Suimura, *Cyclophorus kikaiensis* from Osuni, *Diplommatina kiiensis* and *pubica* from Kii, and *Kaliella ogasawarana* and *Nesopupa dedecora* from Hahajima. A new sub-genus of *Hirasea*, Pils., is described under the name of *Fametesta*, with *H. mirabilis*, n. sp., from Hahajima, as the type. *H. operculina*, Gld., from Peel Island, is also included in this sub-genus.

Pilsbry, Henry A.—Revision of Japanese *Viviparidae*, with Notes on *Melania* and *Bithynia*. Ibid., pp. 115—121, pl. ix.

"The *Viviparidae* of Japan, so far as their appearance in the field of literature is concerned, are involved in mind-destroying chaos," writes the author of this paper, in whose opinion there are four Japanese species, viz.: *V. malleatus*, Rve., of which *V. laeta*, v. Mts., is perhaps only a form, in which case, the name has priority; *V. japonicus*, v. Mts., and var. nov. *iwakawa*; *V. histicus*, Gld; and *V. sclateri*, Ffld. Possibly this last species is only a variety of *V. histicus*.

Professor Pilsbry is of opinion that *V. oxytropis*, Bens., *V. ingallsiana*, Lea non Rve., and *V. stelmaphora*, Bgt., do not occur in Japan.

The following new varieties are also described: *Melania reiniana* v. *hidachiensis* and *M. libertina* v. *latifusus*. Figures are given of the four Japanese *Viviparidae*, the new varieties, and of *Bithynia striatula* v. *japonica*, Pils.

Pilsbry, Henry A.—On the Localities of A. Adams' Japanese *Helicidae*. Ibid., pp. 233—240.

Pilsbry, Henry A.—Additions to the Japanese Land Snail Fauna. Nos. VI, VII. Ibid., pp. 360—382, pls. xvii, xviii, xix—xxi; pp. 517—533, pls. xxvii, xxviii.

Detailed descriptions are here given of species briefly defined in the author's Catalogue of the *Clausiliidae* of the Japanese Empire, and of the following new species, etc.: *Cl. ducalis* v. *decapitata*, *C. heteroptyx*, *C. subutina* v. *leucopeus*, *C. caryostoma* v. *jayi*, *C. graciae*, *C. pigra*, *C. agna*, *C. caloptyx*, *C. daemonorum*, *C. pachyspira*, *C. kurozuensis*, *C. plagioptyx*, *C. subaculus*, *C. neniopsis*, and other new varieties. A list of additions and corrections to the above mentioned Catalogue concludes number vii.

Pilsbry, Henry A.—South-western Land Snails. Ibid., pp. 510—512.

Pilsbry, Henry A.—New Land Mollusca from Idaho. Ibid., p. 593.
Pristiloma idahoense, n. sp.

Reiss, O. M.—Das Ligament der Bivalven. Morphologie seines Ansatzfeldes seine Wirkung, Abstammung zum Schalenwachsthum. Jahr. Ver. fur Vaterl. Naturk. in Wurt., 1902, Bd. lviii, pp. 179—291, pls. ii—v.

Matheron, P.—Note sur les Mollusques Fossiles des Gisements Gardoniens du midi de la France. Ann. Mus. d'Hist. Nat. Marseille.—Geologie, 1902, T. vii, pp. 9—22.

Repelin, J.—Description des Faunes et des Gisements du Cénomanien Saumâtre ou d'eau douce du midi de la France. II. Mollusques. Ann., Mus. d'Hist. Nat. Marseille.—Geologie, 1902, T. vii, pp. 42—112, pls. i—vii.

The author enumerates 95 species, of these 16 are not named, and 58 are described and figured as new. A new genus of *Ampullariidae*, termed *Ampullopsis* (*A. faujasi*, de Serres, type.) is also described.

Andreæ, A.—Zweiter Beitrag zur Binnenconchylienfauna des Miocäns von Oppeln in Schlesien. Mitth. a. d. Roem.—Mus., 1902, nr. 12, pp. 1—31, Fign. 1—11.

The new species are *Oleacina* (*Salasiella*) *fossilis*, *Archaeozonites conicus*, *Hyalinia* (*Polita*) *miocaenica*, *H. (Gyralina) roemeri*, n. subgen., *H. (Vitrea) procrystallina*, *Strobilus bottgeri*, *Pleurodonte (Galactochilus) silesiaca*, *Azeca frechi*, *Coryna oppoliensis* and var. *turrita*, *Leucochilus ferdinandi*, *Planorbis (Gyrorbis) gurichi*, *Adelopoma martensi*, and unnamed species of many other genera.

Springer, Ada—On some living and fossil snails of the genus *Physa*, found at Las Vegas, New Mexico. Proc. Acad. Nat. Sci. Phila., 1902 pp. 513—516, pl. xxvi.

Schepman, M. M.—*Neritina subocellata* (Marts.) Schepm. Nachr. d. Deutsch. Malak. Gesell., 1903, pp. 20—22.

Rolle, H.—Einige neue Binnenmollusken von den Molukken. Ibid., pp. 23, 24.

Adams, Lionel.—The Census of the British Land and Freshwater Mollusca. 8vo, pp. ii, iii, 20, and map. London: 1902. Dulau & Co.

Reprinted from the Journal of Conchology, 1902, vol. 10, pp. 217—237, with an explanation of the "Vice-counties."

Backer, R.—Die Augen einiger Gastropoden. Arb. Zool. Instit. Wien, 1902, pp. 259—290, 2 Tafn.

Schweikart, Alex.—Über die Bildung der Micropyle und des Chorions bei den Cephalopoden. Zool. Anz., 1903, Bd. xxvi, pp. 214—221.

Diener, C.—Noch ein Wort über den Typus der Gattung *Pseudomonotis*. Centralblatt für Miner. Geol. u. Pal., 1903, pp. 17—19.

Chadwick, W. H.—Self-Fecundation in *Planorbis vortex*. Journ. Conch., 1903, vol. 10, p. 265.

Ancel, P.—Sur les mouvements de la chromatine et les nucleoles pendant la période d'augmentation de volume de l'ovocyte d'*Helix*. Arch. de Zool. exp. et gen., 1902 (3 ser.), T. x, Suppl. pp. liii—lvii.

Ancel, P.—Sur le déterminisme cyto-sexuel des gamètes glandes génitales d'*Helix pomatia* sans ovocyte. Ibid., pp. lviii—lxiv., figs. 1, 2.

Ancel, P.—Sur l'hermaphrodisme glandulaire accidentel et le déterminisme cyto-sexuel des gamètes. Ibid., pp. lxxxiv—xciv.

- Lacaze-Duthiers, H. de.**—Morphologie de *Tridacna elongata* et de *Hippopus*. Arch. de Zool. exp. et gen., 1902 (3 ser.), T. x, pp. 19—212, pls. v—x.
- Boutan, L.**—La Detorsion chez les Gastéropodes. Ibid., pp. 241—268, pl. xi.
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EDITOR'S NOTES.

We have to thank many of our subscribers, both at home and abroad, for their kind congratulations and expressions of goodwill on the appearance of the first part of another volume.

The collection of Mollusca made by the late Dr. Francis Archer, of Liverpool, and his son, the late Surgeon-Colonel Archer, has recently been presented to the University of Birmingham.

We understand that the well-known J. T. Marshall Collection of British shells has passed into the hands of Mr. J. R. Brockton Tomlin, of Chester.

Messrs. Sowerby & Fulton have favoured us with a copy of their latest (April, 1903) Catalogue of Cephalopoda, Pteropoda, Gastropoda (Marine and Freshwater), and Scaphopoda, enumerating nearly 4,000 species. As in their previous catalogues, the names are printed in double columns, with wide margins each side, so that it may serve as a check-list also. Museum curators and collectors generally will find it both of use and value.

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VOL. X.

DESCRIPTIONS OF NEW SPECIES OF NASSA,
PURPURA, LATIRUS, VOLUTA, CONUS, STOMATELLA
AND SPONDYLUS.

By G. B. SOWERBY, F.L.S.

(Plate v.)

Nassa optima, n.sp.

Pl. v, figs. 1, 2.

Testa ovato-acuminata, crassa, polita, cinerea, albo unifasciata; spira elata, acuta; anfractus 8, primi $1\frac{1}{2}$ laeves, sequentes planato convexi, costis numerosis crassis leviter obliquis superne nodulosis instructi, sulcis interruptis brevibus paucis spiraliter sculpti, sutura breviter canaliculata sejuncti; penultimus magis convexus, costis evanidis; ultimus $\frac{2}{3}$ longitudinis testae aequans, ventricosus, laevis, superne nodulis inaequalibus paulo elevatis coronatus, basim versus liratus, canaliculatus, rostro brevissimo obliquo acutimarginato; apertura latiuscula, lamina columelari callosa, expansa, intus corrugata, supra uniplicata, peristoma ad marginem acutum, extus late plicato varicosum, intus liratum; canalis anticus latiusculus, recurvus, posticus brevis.

Long. 25, diam. 15 millim.

Hab.—N.W. Australia.

A number of specimens of this interesting species were received from Mr. Bernard H. Woodward, of the West Australian Museum. Compared with *N. coronata*, Brug., the body whorl is much shorter, the spire longer and more acute, the upper whorls being more closely and distinctly plicate; coronation is only faintly indicated.

Purpura eudeli, n.sp.

Pl. v, fig. 3.

Testa ovata, depressiuscula, rugosissima, fuscescens; spira brevis; anfractus $3\frac{1}{2}$ rapide accrescenti, primi $1\frac{1}{2}$ minuti laeves, penultimus convexus, liris 4 spiralibus multituberculatis instructus; sutura concava excavata; anfractus ultimus magnus, longitudinaliter rugose lamellosus transversim octo-costatus, nodulis numerosis elevatis rugosis oblique inclinatis ad marginem concavo productis munitus; apertura ampla, intus coeruleo-cinerea, fusco fasciata, ad marginem nigro-fusco limbata; columella concava depressa, glabra, luteola, macula fusca elliptica superne picta.

Long. 30, diam. 21 millim.

Hab.—Gorée, West Africa (Eudel).

Several specimens of this remarkable *Purpura* in the collection of the late Captain Eudel were labelled *P. grayi*, Kiener, to which it bears some slight external resemblance, but that is a *Monoceros* and was previously described by Dr. Gray under the name of *M. grande*. *P. eudeli* has more affinity with *P. patula*, Linn., but having compared it with many specimens of that species in various stages of growth I am convinced that it is perfectly distinct.

Latirus singularis, n.sp.

Pl. v, fig. 10.

Testa elongato-fusiformis, fusca, solidula; spira elato-pyramidata; anfractus 6, convexi, spiraliter lirati, longitudinaliter striato-laminati, primi 2 laeves, sequentes 3 longitudinaliter plicato-costati, penultimus angulatus, supra angulum leviter concavus, infra convexiusculus; sutura angustissime canaliculata; anfractus ultimus $\frac{2}{3}$ longitudinis testæ superans, angulata, supra angulum concavo depressa, infra leviter convexus, infra medium concavo attenuatus, ad basim late rostratus; umbilicus fere claudens; apertura oblonga, intus pallide lutescens, glabra; peristoma acutum, postice angulatum; columella leviter arcuata, laevis, infra medium obtusissime angulata, haud plicata; canalis latiusculus.

Long. 70, diam. 27 millim.

I am not acquainted with any species of *Latirus* at all resembling this. It appears to form a link between *Latirus* and *Hemifusus*, and may possibly find its place in the latter genus, although its form is more like that prevailing in the former.

Voluta dohrni, n.sp.

Pl. v, fig. 8.

= *Voluta dubia*, Dohrn : Jahrb. D. Mal. Gesell., 1879, vol. vi, pp. 150–156, pl. iv, figs. 1–3; non Broderip : Zool. Journ., vol. iii, p. 81, pl. 3, fig. 1.

The shell is of a rather solid substance, spirally striated throughout,

and has four very oblique plaits on the columella. It is undoubtedly the species figured and described by Dr. Dohrn as *Voluta dubia*, Brod., from which, however, it is perfectly distinct. Broderip's figure in the *Zoological Journal*, copied in the *Conchologia Iconica*, etc., represents a shell so different that it is strange that this species should have been mistaken for it. With the exception of its being spirally striated and somewhat similarly spotted, it differs in almost every respect, and notably in the absence of the remarkable bulb-shaped apex characteristic of *V. dubia*, and which has its counterpart in *Neptuneopsis gilchristi*, Sowerby. Another remarkable error concerns *Fusus tessellatus*, Schub. and Wagn., which has been placed by Kiener, Reeve and others, in the synonymy of *Voluta dubia*, and Dr. Dall describes and figures a shell which may well belong to the former species as representing the latter, but Kiener figures and describes as *Fusus tessellatus*, Schub. and Wagn., a much larger shell of a much more inflated growth and entirely destitute of columella plaits, which may, however, possibly be a full-grown specimen of that species. It is of a very thin, light substance, and does not at all resemble *V. dubia*.

To crown all this confusion Tryon seeks to unite all these forms with *Voluta junonia*, with which, in my opinion, they have scarcely any affinity.

I have come to the conclusion that there are four perfectly distinct species, namely :—

1. *VOLUTA JUNONIA*, Chemn. : *Conch. Cab.*, xi, pl. 177, fig. 1, 704.
2. *VOLUTA DUBIA*, Brod. : *Zool. Journ.*, vol. iii, p. 81, plate iii, fig. 1.
 = *Voluta junonia* var. *dubia*, Tryon : *Man. of Conch.*, vol. vi, p. 90, pl. 27, fig. 81.
 = *Voluta (Aurinia) dubia*, H. and A. Adams : *Gen. Rec. Moll.*, vol. i, p. 166.
3. *VOLUTA TESSELLATA*, Schub. and Wagn.
 = *Fusus tessellatus*, Schub. and Wagn. : *Conch. Cab.*, supp. 3, 048.
 = *Aurinia dubia*, Dall : *Rep. Blake Gastro.*, *Bull. Mus. Comp. Zool.*, 1889, xviii, p. 151 ; *Proc. U.S. Nat. Mus.*, vol. xxiv, p. 504, pl. xxix, fig. 11. Non *Voluta dubia*, Brod.
 ? = *Fusus tessellatus*, Kiener : *Spec. Gen. et Icon. Coq. Viv.*, *Fusus*, p. 39, pl. xxix, fig. 1.
4. *VOLUTA DOHRNI*, Sowerby, n.sp.
 = *Voluta dubia*, Dohrn : *Jahrb. D. Mal. Gesell.*, vol. vi, pp. 150-156, pl. iv, figs. 1-3. Non Brod.
 = *Voluta junonia* var. *dubia* (pro parte), Tryon : *Man. of Conch.*, vol. vi, pl. 27, fig. 77.

***Voluta (Lyria) planicostata*, n.sp.**

Pl. v, fig. 7.

Testa oblongo-fusiformis, solidula, pallide lutescens, lineis numerosis transversis, pallide aurantiacis vittata ; spira elato pyramidalis, convexius-

cula, ad apicem acuta; anfractus 9, primi 2 minuti, laeves, sequentes convexiusculi, longitudinaliter costati, aliter laeves, costis 12 mediocriter elevatis rotundatis; sutura anguste canaliculata; anfractus ultimus $\frac{3}{4}$ longitudinis testae aequans, convexus, infra attenuatus; costis latiusculis paulo elevatis; prope marginem magis elevatis; apertura elongata, mediocriter lata; peristoma laeve, leviter incrassata; columella rectiuscula, intus lirata, inaequaliter triplicata; lamina columellari latiuscula, extus conspicue fusco marginata.

Long. 53, diam. 22 millim.

Hab.—?

Compared with *V. delessertiana* the shell is more fusiform, smoother, with less numerous and less elevated ribs, and in place of the rich colouring of that species, it has a pale creamy hue, with numerous faint yellowish orange transverse lines. The strongest colour in the shell is found on the margin of the columellar lamina forming a dark brown streak.

The specimen as far as I know is unique, and I have no knowledge of its habitat. Although of pale colour it is in good preservation, and appears to be specifically distinct from its congeners.

Conus boubéae, n.sp.

Pl. v, fig. 5.

Testa parva conico-subcylindræa, cinerascens, fusco variegata, lineis numerosis interruptis transversis fuscis albo articulatis picta; spira elatiuscula, planato conica; anfractus 7, primi 2-3 convexiusculi, deinde leviter concavi, ad marginem carinati, sutura canaliculata sejuncti; anfractus ultimus subcylindricus, supra sub-acute angulatus, basim versus liratus; apertura angusta, antice latior, intus violaceo tincta.

Long. 16, diam. 8 millim.

Hab.—?

With the exception of the anterior transverse ridges, which are rather strong, the shell is smooth; of a grayish colour mottled with brown, and prettily marked with interrupted lines of brown and white.

On a recent visit to Paris I found several specimens of this interesting little species in the possession of Madame Boubée, after whom I have leisure in naming it.

Stomatella exquisita, n.sp.

Pl. v, fig. 4.

Testa depressæ orbicularis, tenuis, pallide luteola, strigis obliquis fuscis picta, liris numerosis inaequalibus instructa, oblique eximie laminato striata; spira depressa, ad apicem breviter elevata; anfractus 3, primus globulosus, albus, laevis, secundus lirato carinatus, ultimus superne depressus, bicarinatus, infra rotunde convexus, inaequaliter multiliratus; apertura lata, leviter obliqua, intus margaritacea; columella oblique arcuata, tenuiter callosa.

Lat. 12, alt. 7 millim.

Hab.—?

This species is somewhat like *S. notata*, A. Adams, but the shell is more angular, with two keels more prominent than the remaining lirae.

***Spondylus occidens*, n.sp.**

Pl. v, fig. 9.

Testa suboblique ovata, crassa ; valva superiori planato-convexa, luteola-aurantio-rufo sex-radiata, undique densissime radiatum lirata, liris brevis, sime et densissime muricatis ; valva inferiori ventricosa, luteola, irregulariter squamosa.

Long. 60, lat. 49 millim.

Hab.—Philippines (specimen unique).

A remarkable species very densely imbricated, with minute scales, and two or three rows of somewhat larger ones. It is conspicuously coloured with six orange-red rays.

***Spondylus reesianus*, n.sp.**

Pl. v, fig. 6.

Testa suborbicularis, depressiuscula, aurantiaca, ferrugineo-fusco prope umbonem variegata ; undique multilirata, liris tenuissimis, densissime irregulariter aculeatim spinosis, liris principalibus 6, paulo magis elevatis, squamis erectis elongatis hic illic trifurcatim ramosis munitis ; valva superiori planulata, inferiori convexiuscula.

Long. 55, lat. 53 millim.

Hab.—Moluccas (specimen unique).

This charming shell from the collection of the late Admiral van Rees, is most profusely imbricated with numerous rows of thin spines of unequal length, some of the principal ridges bearing long flattened three-forked scales.

DESCRIPTION OF PLATE V.

- Figs. 1, 2. *Nassa optima*, n.sp.
- Fig. 3. *Purpura eudeli*, n.sp.
- Fig. 4. *Stomatella exquisita*, n.sp.
- Fig. 5. *Comus bouéeae*, n.sp.
- Fig. 6. *Spondylus reesianus*, n.sp.
- Fig. 7. *Voluta planicostata*, n.sp.
- Fig. 8. *Voluta dohrni*, n.sp.
- Fig. 9. *Spondylus occidens*, n.sp.
- Fig. 10. *Latirus singularis*, n.sp.

NOTES ON WITH ILLUSTRATIONS OF AUSTRO-MALAYAN LAND SHELLS.

By E. R. SYKES, B.A., F.L.S.

(Plate vi.)

Recently ⁽¹⁾ I described a few shells from the Austro-Malayan Region; illustrations of them are now given.

PAPUINA WALLACEANA.—For *P. aurora* var. b., at p. 65, read *P. aurora* var. ?.

PAPUINA CALLOSA.—Compare *P. pseudolanceolata*, Dautz., which latter, if it prove to be identical, has a few days priority.

LEPTOPOMA LAMELLATUM.—There appears to be a good deal of confusion in this group. In my view it is probable that *L. tissotianum*, Crosse, *multilabre*, Lamk., and *scalare*, Adams, are all varying forms of one widely scattered species. Dr. Kobelt has in "Das Tierreich" placed the Lamarckian species as a monstrosity of *L. massenae*, a view which, taken though it has been by Pfeiffer and others, has been adversely, and I think correctly, criticised by Tapparone-Canefri.

It may be pointed out that the figures recently given in the "Conchylien-Cabinet," purporting to represent *L. scalare*, Adams, do not agree with Adams' figures, and are probably taken from a Halmahera species and not from the Waigiou shell.

EXPLANATION OF PLATE VI.

- Figs. 1-3. *Cristigibba albopicta*, Sykes.
Fig. 4. *Papuina callosa*, Sykes.
Figs. 5, 6. *Helicina varians*, Sykes.
Fig. 7. *Papuina pyrgus*, Sykes.
Figs. 8, 9. *Xesta sulcatula*, Sykes.
Figs. 10-12. *Leptopoma lamellatum*, Sykes.
Fig. 13. *Palaina ponsonbyi*, Sykes.
Fig. 14. *Papuina wallaceana*, Sykes.
Fig. 15. *Omphalotropis waigiouensis*, Sykes.
Figs. 16-18. *Leptopoma diplochilus*, Sykes.

CONTRIBUTIONS TO A KNOWLEDGE OF THE MOLLUSCA OF BORNEO.

(PART I*.)

By WALTER E. COLLINGE, M.Sc.,
THE UNIVERSITY, BIRMINGHAM.

(Plates vii. and viii.)

In June, 1901, I gave a short account of a small collection of slug-like molluscs from N.W. Borneo⁽¹⁾ for which I was indebted to the kindness of Mr. R. Shelford, of the Sarawak Museum. Since then he has very kindly sent me two further collections, some of which form the subject of the present paper.

Damayantia, Issel.

Damayantia dilecta, Issel.

Damayantia dilecta, Issel: Moll. Born., 1874, p. 390, T. iv, figs. 4-6.
Hab.—Matang, 2,500 feet.

The two longitudinal median furrows mentioned by Issel (Moll. Born., p. 28), and which were not discernible in the specimens I have previously examined from Mt. Penrissen, are very clearly marked in these specimens. They are really a double row of median rugae, with deep sulci between, so that there are three grooves formed by the deep intervening sulci.

Damayantia simrothi, n.sp.

Pl. vii, figs. 1, 2.

Animal a slaty blue, with antero-lateral portions a bright yellow. Mantle smooth and completely covering the shell. The keels are yellowish and well developed on the lateral portions of the visceral mass. Head and tentacles slaty blue. The dorsum exhibits a sharp yellow keel which slopes downwards from behind the visceral mass posteriorly. The rugae are ill-defined excepting postero-laterally, where they are somewhat more distinct. Caudal mucous pore small. Peripodial groove indistinct. Foot-fringe bright yellow in anterior two-thirds, bluish in the posterior third; lineoles exceedingly faint. Foot-sole yellow, narrow, and divided into median and lateral planes.

* My best thanks are here tendered to the Council of the Birmingham Natural History and Philosophical Society, for their kindness in defraying the cost of the original drawings.

1. Trans. Roy. Soc. Edinb., 1901, vol. xl, pp. 295-312, Pls. i-iii.

Length (in alcohol) 24.5 millim.

Hab.—Kuching.

As yet I am unable to give any particulars of the internal structure of this species. Externally it differs from the type of the genus, *D. dilecta*, Issel, in its colour, in the comparative shorter length of the dorsum posterior to the visceral mass, and in the more pronounced keels on the mantle.

I have much pleasure in associating with the name of this new species that of Professor Heinrich Simroth.

***Damayantia rugosa*, n.sp.**

Pl. vii, figs. 3, 4.

Animal mauve or purplish-red in colour; the mantle is devoid of any lateral keels, but is marked by a series of small rugosities. The dorsum is bluntly keeled. Rugae indefinite. Caudal mucous pore and peripodial groove small. Foot-fringe deep, of a yellowish-brown colour. Foot-sole same colour, divided into median and lateral planes.⁽¹⁾

Length (in alcohol) 16 millim.

Hab.—Kuching.

***Wiegmannia*, Cllge.**

***Wiegmannia gigas*, Cllge.**

Wiegmannia gigas, Cllge.: Trans. Roy. Soc. Edinb., 1901, vol. xl, p. 300, pl. i, figs. 6-8; pl. ii, figs. 27, 28.

Hab.—Kuching. Two immature specimens.

***Collingea*, Simr.**

***Collingea eranna*, n.sp.**

Pl. vii, figs. 5, 6; Pl. viii, figs. 13, 14.

Animal a dirty yellow, speckled with light-brown postero-laterally; mantle same colour with darker brown markings. At each side of the head is a dark brownish-coloured band passing from beneath the mantle to the base of the upper tentacles. Dorsum keeled. Caudal mucous pore small. Rugae and peripodial groove indistinct. Foot-fringe same colour as body, no lineoles. Foot-sole a dirty white, not divided into median and lateral planes.

Length (in alcohol) 23.5 millim.

Shell thin, membranaceous, amber coloured, apex indistinct.

Diam. max. 11, min. 6.5 millim.

Hab.—Kuching.

The Generative Organs (Pl. viii, figs. 13, 14).—These differ from those of the four known species, in the elongated vagina and penis and

1. In my former paper, in the diagnosis of the genus, it was stated, in error, that the footsole was not divided into median and lateral planes.

the shorter dart gland and dart-sac. The penis protrudes from its sheath, at the distal end, and on the opposite side there is a small conical papilla distal to which the retractor muscle is inserted. Only a portion of the dart was present in the dart-sac, and this agrees in form with the proximal portion of that of *C. strubelli*, Simr.

Parmarion, P. Fisch.

Parmarion shelfordi, n.sp.

Pl. vii, figs. 7, 8; Pl. viii, figs. 15, 16.

Animal: the whole of the head, mantle and dorsum is blue, with the medio-lateral portions yellow, the lateral margins of the mantle are also yellow, and there is a prominent lateral keel on the mantle, encircling a little more than two-thirds of the visceral mass. The peripodial groove is distinct and rugae only faintly marked. Foot-fringe blue with deeply indented blotches of yellow. Foot-sole yellowish-brown, divided into median and lateral planes.

Length (in alcohol) 32 millim.

Shell thin, membranaceous, oval, with thinner, irregular border, apex indistinct.

Diam. max. 13, min. 8 millim.

Hab.—Kuching.

In my former paper I stated that possibly the genus *Parmarion*, sens. str., did not occur in Borneo, but there can be no question, I think, as to the generic position of the mollusc here described.

The Generative Organs (Pl. viii, figs. 15, 16).—These are characterised by the long free-oviduct, the form of the penis, the short vas deferens, and the form and shape of the dart. The penis has the beak-like distal portion, so characteristic of most species of the genus, and immediately below this is a collar-like sheath, while beyond, the organ becomes more globose. The vas deferens is very short, also the duct of the receptaculum seminis. The dart at its free end is somewhat flattened, with a sharp cutting edge at each side. Above the aperture leading into the cavity of the dart is a solid calcareous head. Passing downward the flattened form gradually disappears until it becomes oval (Pl. viii, fig. 16).

Philomyeus, Raf.

Philomyeus, sp.

From Matang there is a small slug belonging to this genus, which probably may prove to be only a variety of *P. bilineatus*, Bens. It is a bright yellow in colour, with irregular dark brown (almost black) spots and blotches. In alcohol the specimen measures 20 millim. in length.

I am not aware that the genus has hitherto been recorded from Borneo.

Atopos, Simr.
Atopos shelfordi, n.sp.

Pl. vii, figs. 9-12.

Colour of the notum bluish-brown, with a dark, smooth stripe extending along the mid-dorsal line; the whole of the dorsum is finely granulated and spotted with yellow; underside (perinotum?) brown; foot-sole same colour. The keel of the notum is prominent. Length of notum (in alcohol) 64, breadth 11, height 12 millim. Breadth of foot-sole 6 millim. Female generative orifice 12.5 millim. from the male generative orifice.

Hab.—Mt. Penrissen, 4,800 ft., N.W. Borneo. One specimen.

The genus *Atopos* has not previously been recorded from Borneo.

As only a single specimen has been found I am unable to give more than a very brief description of the internal structure. Mr. Shelford has very kindly given me permission to open the animal, but naturally I have not cared to injure it more than was absolutely necessary to establish its specific distinctness. It differs from any known species in a number of points in the form of the alimentary canal and generative organs, the latter being very distinct. I have not given figures of either system, as the specimen examined is evidently not fully mature.

REFERENCE LETTERS.

<i>alb.gl.</i>	Albumen gland.	<i>p.</i>	Penis.
<i>d.gl.</i>	Dart gland.	<i>pr.</i>	Prostate.
<i>d.s.</i>	Dart-sac.	<i>r.d.</i>	Receptacular duct.
<i>f.ov.</i>	Free-oviduct.	<i>r.m.</i>	Retractor muscle.
<i>H.</i>	Portion of the penis protruding from its sheath.	<i>r.s.</i>	Receptaculum seminis.
<i>h.d.</i>	Hermaphrodite duct.	<i>v.</i>	Vestibule.
<i>h.gl.</i>	Hermaphrodite gland.	<i>v.d.</i>	Vas deferens.
<i>ov.</i>	Oviduct.	<i>v.g.</i>	Vagina.

EXPLANATION OF PLATES VII. AND VIII.

PLATE VII.

FIG. 1.	<i>Damayantia simrothi</i> , n.sp.	Right lateral view.	× 2.
FIG. 2.	" "	Dorsal view.	× 2.
FIG. 3.	<i>Damayantia rugosa</i> , n.sp.	Right lateral view.	× 2½.
FIG. 4.	" "	Dorsal view.	× 2½.
FIG. 5.	<i>Collingea eranna</i> , n.sp.	Right lateral view.	× 1½.
FIG. 6.	" "	Dorsal view.	× 1½.
FIG. 7.	<i>Farmarion shelfordi</i> , n.sp.	Right lateral view.	× 1½.
FIG. 8.	" "	Dorsal view.	× 1½.
FIG. 9.	<i>Atopos shelfordi</i> , n.sp.	Right lateral view.	× 1.
FIG. 10.	" "	Dorsal view.	× 1.
FIG. 11.	" "	Ventral view.	× 1.
FIG. 12.	" "	Portion of the dorsum, highly magnified.	

PLATE VIII.

FIG. 13.	<i>Collingea eranna</i> , n.sp.	Portion of the generative organs.
FIG. 14.	" "	Portion of the dart.
FIG. 15.	<i>Farmarion shelfordi</i> , n.sp.	The generative organs.
FIG. 16.	" "	Dart. × 17.

A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART VII, *)

By G. K. GUDE, F.Z.S.

F. CELEBES.

Family **Zonitidae.**

Sub-family **Ariophantinae.**

Genus **TROCHONANINA**, Mouss.
celebesiana, Kob.

Genus **XESTA**, Alb.

cincta, Lea.

= menadensis, Mouss.

v. mongondica, Sar.

v. limbifera, Mart.

wallacei, Pfr.

v. bicingulata, Mart.

cidaris, Lam.

balantensis, Kob.

trochus, Müll.

= sulphurea, Reeve.

= circumpecta, Mouss.

stuartiae, Sowb.

nemorensis, Müll.

celebensis, Pfr.

vitellus, Shutt.

fulvizona, Mouss.

colorata, Mouss.

succincta, Mdff. (? Celebes).

porcellanica, Sar.

semilactea, Sar.

ardens, Sar.

nitida (Mdff.), Sar.

= fulvizona v. nitida, Mdff.

fennemae, Sar.

dimidiata, Smith.

Sub-family **Macrochlaminae.**

Genus **EVERETTIA**, G.-A.

fulvocarnea, Mart.

möllendorffi, Kob.

Genus **HEMIPLECTA**, Alb.

limbifera, Mart.

semisculpta, Mart.

v. matinangensis, Sar.

rugata, Mart.

v. montana, Sar.

ribbei, Dohrn.

sibylla, Can.

weberi, Sar.

wichmanni, Sar.

totojensis, Sar.

braam-morrisi, Sar.

bonthainensis, Smith.

Genus **MACROCYCLOIDES**, Mart.

aberrans, Mdff.

Sub-family **Helicarioninae.**

Genus **HELICARION**, Fér.

idae, Pfr.

riedelii, Mart.

celebensis, Pfr.

adolphi, Boettg.

minahassae, Kob.

wallacei, Smith.

annularis, Kob.

Sub-genus **LEPTODONTARION**, Sar.

* See ante, p. 45.

- albacuminatus, Sar.
 coriaceus, Sar.
 Genus **OTESIA**, H. Ad.
 flammulata, Q. and G.
 viridis, Q. and G.
 lenticula, Sar.
 ombrophila, Sar.
 alsophila, Sar.
 hygrophila, Sar.
 Genus **LAMPROCYSTIS**, Pfr.
 matinangensis, Sar.
 cursor, Sar.
 macassarica, Sar.
 soputensis, Sar.
 musciicola, Sar.
 indifferens, Smith.
 consors, Smith.
 consimilis, Smith.
 Genus **SITALA**, H. Ad.
 diplotropis, Mdff.
 javana v. celebesiana, Mdff.
 celebica, Sar.
 Genus **KALIELLA**, W. T. Blanf.
 doliolum, Pfr.
 celebesiana, Mdff.
 platyconus v. intermedia, Mdff.
 Sub-family **Zonitinae**.
 Genus **TROCHOMORPHA**, Alb.
 planorbis, Less.
 v. ussuwensis, Smith.
 gorontalensis, Mart.
 minahassae, Sar.
 ternatana, Le G.
 robusta, Sar.
 Genus **VITRINOCONUS**, Semp.
 celebesianus, Kob.
 marosianus, Sar.
 applanatus, Sar.
 pileolus, Sar.
 Family **Endodontidae**.
 Group **Haplogona**, Pils.
 Genus **ENDODONTA**, Alb.
 celebica, Sar.
 Family **Helicidae**.
 Group **Epiphallogona**, Pils.
 Genus **CAMAENA**, Alb.
 Sub-genus **PSEUDOBBA**, Mdff.
 mamilla, Fér.
 quoyi, Desh.
 = undulata, Q. and G.
 Genus **OBBA**, Beck.
 papilla, Müll.
 v. heroica, Pfr.
 v. pygmaea, Sar.
 v. platybasis, Mdff.
 papilliformis, Mdff.
 listeri, Gray.
 v. mongondica, Sar.
 v. matinangensis, Sar.
 v. buolica, Sar.
 v. tominica, Sar.
 marginata, Müll.
 v. sororecula, Mart.
 = devincta, Can.
 Genus **PLANISPIRA**, Beck.
 Sub-genus **PLANISPIRA**, s.s.
 zebra, Pfr.
 ? = guttata, Le G.
 flavidula, Mart.
 bulbulus, Mouss.
 = bulbus, Mouss.
 v. gloriosa, Sar.
 tuba, Alb.
 v. centrocelebensis, Sar.
 howesi (Smith), Sar.
 (Chloritis howesi, Smith.)
 zodiaca, Fér.
 v. unicolor, Sar.
 v. bonthainensis (Smith), Sar.
 = howesi v. bonthainensis,
 Smith.
 lansbergiana, Dohrn.
 Sub-genus **TRACHIA**, Alb.
 pilisparsa, Mart.
 = gabata, Wallace non Gld.
 Genus **CHLORITIS**, Beck.
 Section **CHLORITIS**, s.s.
 biomphala, Pfr.

minahassae, Sar.
 Section TRICHOCHLORITIS, Pils.
 balantensis, Kob.
 talabensis, Kob.
 plena, G.-A. v. celebensis, Smith.
 Genus PAPUINA, Mart.
 euchroes, Pfr.
 Genus AMPHIDROMUS, Alb.
 beccarii, Can.
 perversus, Linn.
 = v. obesa, Mart.
 v. nivea, Sar.
 v. tener, Mart.
 interruptus, Müll.
 = v. infrapicta, Mart.
 v. strigosa, Mart.
 v. infraviridis, Mart.
 v. sultana, Lam.
 = makassariensis, H. and J.
 maculatus (Fult.), Pils.
 = contrarius v. maculata,
 Fult.
 jucundus (Fult.), Pils.
 = filizonatus v. jucunda,
 Fult.
 sinistralis, Reeve.
 v. fasciata, Sar.
 v. decolor, Can.
 v. rosea, Fult.
 v. lutea, Fult.
 kruijti, Sar.
 Genus GANESELLA, W. T. Blanf.
 bembicodes, Mdff.
 leucophlaea, Mart.
 BELOGONA EUADENIA.
 Genus EULOTA, Hartm.
 suffodiens, Boettg.
 = fodiens, Wallace non Pfr.
 textoria, Mart.
 similaris, Fér.
 v. solidula, Mouss.
 Genus PLECTOTROPIS, Mart.
 winteriana, Pfr.

DOUBTFUL RECORD.

Sulcobasis sulcosa, Pfr. (Reeve).

a. SANGIR.

Genus TROCHOMORPHA, Alb.
 staudingeri, Anc.
 Genus CAMAENA, Alb.
 Sub-genus PSEUDOBBA, Mdff.
 tirmaniana, Anc.
 linnaeana, Pfr.
 Genus HELICOSTYLA, Fér.
 Section CRYSTALLOPSIS, Anc.
 leucophthalma, Pfr.
 v. fusco-strigata, Anc.
 Section CALOCOCHLEA, Hartm.
 tukanensis, Pfr.

b. TALAUT (? TALAUTSE).

Genus OBBA, Beck.
 meyeri, Mdff.
 marginata, Müll.
 Genus HELICOSTYLA, Fér.
 Section CORASIA, Alb.
 puella v. lais, Pfr.¹
 Section CRYSTALLOPSIS, Anc.
 physalis, Pfr.
 Section CALOCOCHLEA, Hartm.
 tukanensis, Pfr.
 talautana, Gude.

c. TULAR (OR TALAUR).

Genus HELICOSTYLA, Fér.
 Section CRYSTALLOPSIS, Anc.
 physalis, Pfr.

d. XULLA ISLANDS.

Genus XESTA, Alb.
 citrina, Linn.

e. BANGAYA.

Genus XESTA, Alb.
 vitellus, Shutt.
 = bangaiensis, Kob.

- Genus *HEMIPLECTA*, Alb.
limbifera v. *bangaiensis*, Mart.
- Genus *PLANISPIRA*, Beck.
zodiaca, Fér.
- f. BUTON.
- Genus *XESTA*, Alb.
butonensis, Sar.
v. nigrotaeniata, Mdff.
v. fulva, Mdff.
v. albozonata, Mdff.
v. varia, Mdff.
- g. TUKAN BESSI GROUP.
- Genus *XESTA*, Alb.
kaledupana, Rolle. Kaledupa.
perfragilis, Mdff. Kaledupa.
tomiana, Rolle. Tomia.
- Genus *HEMIPLECTA*, Alb.
subsulcata, Rolle. Kaledupa.
- Genus *AMPHIDROMUS*, Alb.
kuehni, Rolle. Tukan Bessi.
- Genus *EULOTA*, Hartm.
textoria, Mart. Tomia.
- Genus *HELICOSTYLA*, Fér.
- Section *HELICOSTYLA*, s.s.
indusiata, Pfr. Tukan Bessi.
thomsoni, Pfr. Tukan Bessi.
- Section *CALOCOCHLEA*, Hartm.
tukanensis, Pfr.
- Section *CORASIA*, Alb.
obliquata, Mdff. non Desh.
- h. SALEYER (or Salayar).
- Genus *XESTA*, Alb.
fulvizona, Mouss.
salayarensis, Smith. Bauluan Islet.
- Genus *MACROCHLAMYS*, Bens.
minuta, Mart.
- Genus *MICROCYSTINA*, Mörch.
consueta, Smith.
- Genus *HEMIPLECTA*, Alb.
rareguttata, Mouss.
= *fulvizona* v. *elator*, Mart.
- Genus *AMPHIDROMUS*, Alb.
interruptus v. *sultana*, Lam.
annae, Mart.
- Genus *EULOTA*, Hartm.
textoria, Mart.
- Genus *HELICOSTYLA*, Fér.
- Section *CORASIA*, Alb.
subtenuis, Smith.
- i. JAMPEA.
- Genus *MICROCYSTINA*, Mörch.
consueta, Smith.
- Genus *TROCHOMORPHA*, Alb.
jampeana, Smith.
- Genus *PLANISPIRA*, Beck.
admirabilis, Smith.
- Genus *EULOTA*, Hartm.
textoria, Mart.
- j. KALAO.
- Genus *XESTA*, Alb.
kalaoensis, Smith.
- Genus *MICROCYSTINA*, Mörch.
consueta, Smith.
- Genus *KALIELLA*, W. T. Blanf.
indifferens, Boettg.
- Genus *AMPHIDROMUS*, Alb.
kalaoensis, Fult.
- Genus *GANESELLA*, W. T. Blanf.
crassiuscula (Smith).
(Plectotropis *crassiuscula*, Smith.)
- Genus *EULOTA*, Hartm.
textoria, Mart.
- k. BONERATU.
- Genus *CHLORITIS*, Beck.
- Section *AUSTROCHLORITIS*, Pils.
argillacea, Fér.
- Genus *GANESELLA*, W. T. Blanf.
crassiuscula (Smith).
(Plectotropis *crassiuscula*, Smith.)

G. LESSER SUNDA ISLANDS.

a. BALI.

Genus *HEMIPLECTA*, Alb.

rareguttata, Mouss.

v. sparsa, Mouss.

baliensis, Mouss.

v. waandersiana, Mouss.

Genus *KALIELLA*, W. T. Blanf.

angigyra, Mdff.

Genus *TROCHOMORPHA*, Alb.

micula, Mouss.

Genus *AMPHIDROMUS*, Alb.

interruptus, Müll.

= v. infrapictus, Mart.

v. emaciata, Mart.

v. sultana, Lam.

v. mitra, Mart.

Genus *EULOTA*, Hartm.

transversalis, Mouss.

b. LOMBOK.

Genus *EVERETTIA*, G.-A.

perglabra, Smith.

Genus *MICROCYSTINA*, Mörch.

dyakana, G.-A.

Genus *TROCHONANINA*, Mouss.

oxyconus, Mart.

Genus *HEMIPLECTA*, Alb.

nemorensis, Müll.

cofea, Pfr.

rufolineata, Smith.

internota, Smith.

fruhstorferi, Mart.

perinsignis, Smith.

Genus *HELICARION*, Fér.

lineolatus, Mart.

Genus *PARMARION*, P. Fisch.

intermedium, Cllge.

everetti, Cllge.

Genus *SITALA*, H. Ad.

collinae, Smith.

Genus *TROCHOMORPHA*, Alb.

bicolor, Mart.

Genus *PLANISPIRA*, Beck.

infracta, Mart.

= porcellana, Pfr. non Grat.

Genus *PLECTOTROPIS*, Mart.

smiruensis, Mouss.

Genus *PUPISOMA*, Stol.

pulvisculum, Issel.

c. SUMBAWA.

Genus *HEMIPLECTA*, Alb.

rareguttata, Mouss.

halata, Mouss.

nemorensis, Müll.

bimaensis, Mouss.

adolescens, Smith.

sumbawana, Smith.

Genus *DURGELLA*, G.-A.

sumbawaensis, G.-A. (emend.)

= sumbaensis, G.-A.

Genus *TROCHOMORPHA*, Alb.

discreta, Smith.

Genus *PLANISPIRA*, Beck.

infracta, Mart.

= porcellana, Pfr. non Grat.

Genus *AMPHIDROMUS*, Alb.

pocilochroa, Fult.

d. SUMBA.

Genus *HEMIPLECTA*, Alb.

baliensis v. soembaensis, Schepm.

cochlostyloides, Schepm.

Genus *CHLORITIS*, Beck.Section *AUSTROCHLORITIS*, Pils.

argillacea, Fér.

Section *TRICHOCHLORITIS*, Pils.

conjuncta, Smith.

= conjector, Fult.

Genus *THERSITES*, Pfr.Sub-genus *RHAGADA*, Alb.

supracostulata, Schepm.

Genus *AMPHIDROMUS*, Alb.

latestrigatus, Schepm.

sumbaensis, Fult.
consobrinus, Fult.
suspectus, Mart.

e. DANA.

Genus *THERSITES*, Pfr.
Sub-genus *RHAGADA*, Alb.
colona, Mart.

f. FLORES.

Genus *XESTA*, Alb.
polymorpha, Smith.
subpolita, Smith.
melanoraphe, Smith.
carinocincta, Smith.
Genus *RHYSOTA*, Alb.
peramoena, Smith.
Genus *HEMIPLECTA*, Alb.
rareguttata, Mouss.
v. crebriguttata, Mouss.
v. venusta, Beck.
trochus, Müll.
v. pyramidata, Mart.
nemorensis, Müll.
v. endeana, Mart.
everetti, Smith.
floreiana, Mart.
vomer, Mart.

Genus *CHLORITIS*, Beck.
Section *AUSTROCHLORITIS*, Pils.

argillacea, Fér.
albodontata, Smith.
Genus *THERSITES*, Pfr.
Sub-genus *RHAGADA*, Alb.
floreiana, Mart.
Genus *AMPHIDROMUS*, Alb.
floreianus, Fult.
consobrinus, Fult.
Genus *PLECTOTROPIS*, Mart.
winteriana, Pfr.
rotatoria, v.d.B.

g. SOLOR.

Genus *HEMIPLECTA*, Alb.

rareguttata, Mouss.
v. crebriguttata, Mart.
v. venusta, Beck.

Genus *CHLORITIS*, Beck.

Section *AUSTROCHLORITIS*, Pils.

argillacea, Fér.

Genus *THERSITES*, Pfr.

Sub-genus *RHAGADA*, Alb.
solorensis, Mart.

h. ADENARA.

Genus *XESTA*, Alb.
parcipila, Mart.
Genus *HEMIPLECTA*, Alb.
rareguttata, Mouss.
v. sparsa, Mouss.
v. crebriguttata, Mart.
v. venusta, Beck.
Genus *CHLORITIS*, Beck.
Section *AUSTROCHLORITIS*, Pils.
argillacea, Fér.
Genus *PLANISPIRA*, Beck.
adenarana, Fult. (emend.)
Genus *PLECTOTROPIS*, Alb.
winteriana, Pfr.

i. PURA.

Genus *HEMIPLECTA*, Alb.
rareguttata, Mouss.
v. crebriguttata, Mart.
Genus *AMPHIDROMUS*, Alb.
oscitans, Mart.
inconstans, Fult.

j. PANTAR.

Genus *AMPHIDROMUS*, Alb.
inconstans, Fult.

k. ALOR (OR OMBAI).

Genus *HEMIPLECTA*, Alb.
rareguttata, Mouss.
v. crebriguttata, Mart.
Genus *CHLORITIS*, Beck.

Section AUSTROCHLORITIS, Pils.
argillacea, Fér.

Genus AMPHIDROMUS, Alb.

oscitans, Mart.

= inconstans var D. Fult.

inconstans, Fult.

v. gracilis, Mart.

1. TIMOR.

Genus XESTA, Alb.

tumens, Desh.

cidaris, Lam.

dammaensis, Smith.

Genus HEMIPLECTA, Alb.

stuartiae, Sowb.

peaseana, Pfr.

inquinata, v.d.B.

Genus HELICARION, Fér.

sericeus, Mart.

Genus TROCHOMORPHA, Alb.

tricolor, Mart.

timorensis, Mart.

Genus PLANISPIRA, Beck.

zonaria, Linn.

Genus CHLORITIS, Beck.

Section AUSTROCHLORITIS, Pils.

argillacea, Fér.

mendax, Mart.

Genus AMPHIDROMUS, Alb.

reflexilabris, Schepm.

contrarius, Müll.

v. subconcolor, Mart.

v. crassa, Fult.

suspectus, Mart.

v. albolabiata, Fult.

sinistralis, Réeve.

Genus EULOTA, Hartm.

similaris, Fér.

SPURIOUS RECORD.

Crystallopsis conformis, Fér.

(See *Waigiou*.)

m. ROTTI.

Genus XESTA, Alb.

cidaris, Lam.

Genus AMPHIDROMUS, Alb.

contrarius, Müll.

n. SAMAUW.

Genus CHLORITIS, Beck.

Section AUSTROCHLORITIS, Pils.

argillacea, Fér.

mendax, Mart.

H. MOLUCCAS.

a. GILOLO (OR HALMAHERA).

Family Zonitidae.

Sub-family Ariophantinae.

Genus XESTA, Alb.

citrina, Linn.

aulica, Pfr.

sulfurata, Mart.

halmaherica, Strub.

Sub-family Helicarioninae.

Genus HELICARION, Fér.

kukenthali, Kob.

halmahericus, Kob.

Genus LAMPROCYSTIS, Pfr.

subangulata, Boettg.

ambonica, Boettg var.

Sub-family Zonitinae.

Genus TROCHOMORPHA, Alb.

ternatana, Le G.

lardea, Mart.

timorensis, Mart.

planorbis, Less.

Family Helicidae.

Group Epiphalligona, Pils.

Genus CAMAENA, Alb.

Sub-genus PHOENICOBIVS, Mdff.

anacardium, Dohrn.

Genus OBBA, Beck.

calcar, Mart.

Genus PLANISPIRA, Beck.

Sub-genus PLANISPIRA, s.s.

halmaherica, Strub.

quadrifasciata, Le G.

v. halmaherica, Gude.

scheepmakeri, Pfr.

v. halmaherica, Kob.

zonaria, Linn.

endoptycha v. compta, H. Ad.

zonalis, Fér.

= leucostoma, A. and R.

= subangulata, Pfr. juv.

atacta, Pfr.

loxotropis, Pfr.

v. bernsteini, Mart.

v. laticlavata, Mart.

v. pluricincta, Mart.

v. lorquini, Mart.

tietzeana, Rolle.

surrecta, Boettg.

exceptiuncula, Fér.

v. phryne, Pfr.

thetis, Pfr.

Sub-genus CRISTIGIBBA, Can.

mersispira, Mart.

giloloensis, Smith.

albopicta, Sykes.

Genus ALBERSIA, H. Ad.

pubicepa, Mart.

zonulata, Fér.

pseudocorasia, Strub.

Genus PAPUINA, Mart.

vitrea, Fér.

= albula, Le G.

chondrodes, Strub.

lanceolata, Pfr.

callosa, Sykes.

Genus PYROCHILUS, Pils.

lampas, Müll.

pyrostoma, Fér.

pseudolampas, Kob.

kukenthali, Kob.

brunonis, Kob.

BELOGONA EUADENIA.

Genus PLECTOTROPIS, Mart.

winteriana, Pfr.

b. MOROTAI (OR MORTI).

Genus TROCHOMORPHA, Alb.

hartmanni, Pfr.

Genus DENDROTRUCHUS, Pils.

labuanensis, Pfr. *

Genus PLANISPIRA, Beck.

loxotropis, Pfr.

v. bernsteini, Mart.

v. pluricincta, Mart.

c. TERNATE GROUP.

1. TERNATE.

Genus XESTA, Alb.

aulica, Pfr.

sulfurata, Mart.

Genus LAMPROCYSTIS, Pfr.

subangulata, Boettg.

Genus TROCHOMORPHA, Alb.

planorbis, Less.

v. lessoni, Mart.

approximata, Le G.

ternatana, Le G.

Genus PLANISPIRA, Beck.

quadrifasciata, Le G.

endoptycha, Mart.

atacta, Pfr.

loxotropis v. laticlavata, Mart.

v. lorquini, Mart.

exceptiuncula v. phryne, Pfr.

Genus PAPUINA, Mart.

pileus, Müll.

= pileata, Gm.

vitrea, Fér.

= albula, Le G.

lanceolata, Pfr.

Genus PLECTOTROPIS, Mart.

winteriana, Pfr.

2. TIDOR.

Genus TROCHOMORPHA, Alb.

planorbis, Less.

ternatana, Le G.

Genus PAPUINA, Mart.

vitrea, Fér.*

lanceolata, Pfr.

3. MAREH (OR POTTEBAKKERS
EILAND).

Genus TROCHOMORPHA, Alb.
planorbis, Less.

Genus PLANISPIRA, Beck.

quadrifasciata, Le G.

v. edentata, Mart.

= instricta, Mart.

endoptycha, Mart.

loxotropis v. lorquini, Mart.

4. MOTIR (OR MOTI).

Genus TROCHOMORPHA, Alb.
ternatana, Le G.

Genus PLANISPIRA, Beck.

Sub-genus PLANISPIRA, s.s.

aurita, Mart.

Sub-genus CRISTIGIBBA, Can.

mersispira, Mart.

Genus PAPUINA, Mart.

vitrea, Fér.

lanceolata, Pfr.

5. MAKKIAN.

Genus TROCHOMORPHA, Alb.
ternatana, Le G.

6. KAIOA (OR KAJAU).

Genus PLANISPIRA, Beck.

quadrifasciata, Le G.

v. edentata, Mart.

= instricta, Mart.

atacta, Pfr.

loxotropis v. lorquini, Mart.

d. BATCHIAN (OR BATJAN).

Genus XESTA, Alb.

ignescens, Pfr.

luctuosa, Beck.

sulfurata, Mart.

Genus LAMPROCYSTIS, Pfr.

ambonica, Boettg.

v. exigua, Boettg.

subangulata, Boettg.

Genus KALIELLA, W. T. Blanf.

miliacea, Mart.

= milium, Mart.

Genus TROCHOMORPHA, Alb.

planorbis, Less.

ternatana, Le G.

v. batchianensis, Pfr.

Genus PLANISPIRA, Beck.

Sub-genus PLANISPIRA, s.s.

scheepmakeri, Pfr.

zonaria v. coluber, Beck.

endoptycha, Mart.

= compta, H. Ad.

zonalis, Fér.

atrofusca, Pfr.

loxotropis, Pfr.

v. angusticlavia, Mart.

kurri, Pfr.

buelowi, Rolle.

exceptiuncula, Fér.

v. aspasia, H. Ad.

= v. elatior, Mart.

thetis, Pfr.

Sub-genus CRISTIGIBBA, Can.

corniculum, H. and J.

= kiesneri, Le G.

semirasa, Mouss.

= moluccensis, Pfr.

expansa, Pfr.

anozona, Mart.

lacteocincta, Smith.

Genus CHLORITIS, Beck.

Section SULCOBASIS, Can.

rubra, Alb.

Genus ALBERSIA, H. Ad.

pubicepa, Mart.

zonulata, Fér.

Genus PAPUINA, Mart.

- gaberti, Less.
 pileolus, Fér.
 v. turrita, Mart.
 v. pyramidata, Mart.
 v. convexa, Mart.
 rhynchostoma, Pfr.
 nodifera, Pfr.
 ohlendorffi, Kob.
 Genus PYROCHILUS, Pils.
 sulcocinctus, Mart.
 pyrostoma, Fér.
 v. extincta, Can.
 v. lucernalis, Kob.
 v. nigrescens, Kob.
 xanthostoma, Herkl.
 Genus PLECTOTROPIS, Mart.
 winteriana, Pfr.
- e. TAWALLY.
- Genus TROCHOMORPHA, Alb.
 planorbis, Less.
 ternatana, Le G.
 Genus PLANISPIRA, Beck.
 biconvexa, Mart.
 Genus PAPUINA, Mart.
 pileolus v. depressa, Mart.
- f. OBI.
- Genus XESTA, Alb.
 obiana, Mdff.
 sulcatula, Sykes.
 Genus MACROCHLAMYS, Bens.
 obiana, Mdff.
 Genus OTESIA, H. Ad.
 taeniolata, Mdff.
 Genus TROCHOMORPHA, Alb.
 ternatana, Le G.
 v. subternatana, Dautz.
 bicolor, Mart.
 Genus PLANISPIRA, Beck.
 quadrifasciata v. rollei, Mdff.
 v. kendigiana, Mdff.
 liedtkei, Mdff.
 spiriplana, Mdff.
- pruinosa, Mdff.
 kurri v. obiensis, Dautz.
 Genus ALBERSIA, H. Ad.
 pubicepa, Mart.
 = waterstraati, Mdff.
 obiensis, Mart.
 = obiana, Mdff.
 = omissa, Dautz.
 Genus PAPUINA, Mart.
 obiana (Mdff.), Dautz.
 = rhynchostoma v. obiana,
 Mdff.
 = groulti, Dautz.
 piliscus, Mart.
 = pseudosatsuma, Mdff.
 = obiensis, Dautz.
 v. minor, Dautz.
 unicolor (Mdff.), Dautz.
 = lanceolata v. unicolor, Mdff.
 = pseudolanceolata, Dautz.
- g. CERAM.
- Genus XESTA, Alb.
 citrina, Linn.
 v. tiara, Beck.
 v. opaca, Mart.
 v. praetexta, Mart.
 v. aurantia, Mart.
 v. columellaris, Mart.
 luctuosa, Beck.
 Genus HEMIPLECTA, Alb.
 bella, Pfr.
 Genus MACROCYCLOIDES, Mart.
 quadrifasciata, Mart.
 Genus TROCHOMORPHA, Alb.
 lardea, Mart.
 Genus OBBA, Beck.
 kobeltiana, Pfr.
 Genus PLANISPIRA, Beck.
 zebra, Pfr.
 ? = guttata, Le G.
 zonaria, Linn.
 v. obliquata, Mart.
 v. maculata, Mart.

v. lunulata, Mart.
 v. fasciata, Mart.
 v. fasciolata, Less.
 v. martini, Schepm.
 v. coluber, Beck.
 latizona, Pfr.
 kurri, Pfr.*
 Sub-genus CRISTIGIBBA, Can.
 margaritis, Pfr.
 v. zonulella, Mouss.
 Genus CHLORITIS, Beck.
 Section CHLORITIS, s.s.
 unguina, Linn.
 v. minor, Fér.
 biomphala, Pfr.
 martensi, Pfr.
 circumdata, Fér.
 molliseta, Pfr.
 ceramensis, Pfr.
 unguicula, Fér.
 Genus AMPHIDROMUS, Alb.
 laevus, Müll.
 ? = kobelti, Rolle.

 h. BURU.
 Genus XESTA, Alb.
 citrina v. dimidiata, Fav.
 Genus MACROCHLAMYS, Bens.
 amboinensis, Mart.
 buruana, Mdff.
 Genus EVERETTIA, G.-A.
 consul, Pfr.
 Genus HEMIPLECTA, Alb.
 peaseana, Pfr.
 Genus MICROCYSTINA, Mörch.
 marginata, Mdff.
 irregularis, Mdff.
 Genus MACROCYCLOIDES, Mart.
 lutea, Mart.
 Genus HELICARION, Fér.
 idae, Pfr.
 suturalis, Mart.
 rollei, Mdff.
 Genus OTESIA, H. Ad.

buruana, Mdff.
 Genus TROCHOMORPHA, Alb.
 planorbis, Less.
 tricolor, Mart.
 lardea, Mart.
 discus, Mdff.
 Genus PLANISPIRA, Beck.
 Sub-genus PLANISPIRA, s.s.
 zonaria, Linn.
 v. fulminata, Mart.
 v. coluber, Beck.
 Sub-genus CRISTIGIBBA, Can.
 buruensis, Pons. and Sykes.
 Genus CHLORITIS, Beck.
 Section CHLORITIS, s.s.
 unguiculina, Mart.
 unguiculastra v. buruensis, Mart.
 gruneri, Pfr.
 = buruana, Mdff.
 mima, Fult.
 selenitoides, Fult.
 kuhni, Mdff.
 mirabilis, Mdff.
 Genus HELICOSTYLA, Fér.
 Section CRYSTALLOPSIS, Anc.
 najas, Pfr.

 i. AMBOYNA.
 Genus XESTINA, Semp.
 minima, Boettg.
 Genus XESTA, Alb.
 citrina, Linn.
 v. dimidiata, Fav.
 v. coagulata, Pfr.
 vitellus, Shutt.
 spiralis, Le G.
 ovivitellus, Reeve.
 strubelli, Boettg.
 Genus MACROCHLAMYS, Bens.
 amboinensis, Mart.
 Genus HEMIPLECTA, Alb.
 monozonalis, Lam.
 humphreysiana v. rapa, Müll.
 simplex, Lam.

Genus *MACROCYCLOIDES*, Mart.
microcyclis, Boettg.

Genus *LAMPROCYSTIS*, Pfr.
ambonica, Boettg.
v. exigua, Boettg.
gemma v. pallidior, Boettg.
subangulata, Boettg.

Genus *SITALA*, H. Ad.
bandongensis, Boettg.

Genus *KALIELLA*, W. T. Blanf.
miliacea, Mart.
= milium, Mart.
indifferens, Boettg.

Genus *TROCHOMORPHA*, Alb.
lardea, Mart.

Genus *PLANISPIRA*, Beck.

Sub-genus *PLANISPIRA*, s.s.
zonaria v. lineolata, Mart.
v. nitidiuscula, Boettg.
v. fasciolata, Less.
v. collis, Mouss.
v. coluber, Beck.

Sub-genus *CRISTIGIBBA*, Can.
tortilabia, Less.
= torticollis, Le G.
= gibbosula, H. and J.

Genus *CHLORITIS*, Beck.

Section *CHLORITIS*, s.s.
unguiculastra v. amboinensis,
Mart.
unguicula, Fér.
= unguina, Chemn. non L.

Genus *ALBERSIA*, H. Ad.
zonulata, Fér.

Genus *PAPUINA*, Mart.
pileus, Müll. (? Amboyna.)
steursiana, Shutt.

Genus *PUPISOMA*, Stol.
philippinicum, Mdff.

j. HARUKU.

Genus *XESTA*, Alb.
strubelli, Boettg.
v. opaca, Boettg.

Genus *MACROCYCLOIDES*, Mart.
sericina, Boettg.

Genus *LAMPROCYSTIS*, Pfr.
ambonica, Boettg.

Genus *SITALA*, H. Ad.
bandongensis, Boettg.

Genus *TROCHOMORPHA*, Alb.
lardea, Mart.

Genus *PLANISPIRA*, Beck.
zonaria v. nitidiuscula, Boettg.

k. SAPARUA.

Genus *XESTA*, Alb.
citrina v. dimidiata, Fav.
strubelli, Boettg.

Genus *MACROCHLAMYS*, Bens.
martini, Schepm.

Genus *MACROCYCLOIDES*, Mart.
saparuaana, Boettg.

Genus *KALIELLA*, W. T. Blanf.
miliacea, Mart.
= milium, Mart.
indifferens, Boettg.

Genus *TROCHOMORPHA*, Alb.
planorbis, Less.
v. lessoni, Mart.

Genus *PLANISPIRA*, Beck.
zonaria v. nitidiuscula, Boettg.

Genus *CHLORITIS*, Beck.
unguiculastra v. pilosa, Mart.

l. KEFFING ISLAND.

Genus *AMPHIDROMUS*, Alb.
laevus, Müll.
? = kobelti, Rolle.

m. GORAM.

Genus *XESTA*, Alb.
citrina v. praetexta, Mart.
v. velum, Can.
luctuosa, Beck.

Genus *PLANISPIRA*, Beck.
zebra, Pfr.

Genus PAPUINA, Mart.

triumphalis, Reeve.

Genus HELICOSTYLA, Fér.

Section CRYSTALLOPSIS, Anc.

najas, Pfr.

extensa, Müll.

n. BANDA GROUP.

1. BANDA NEIRA.

Genus XESTA, Alb.

citrina v. dimidiata, Fav.

Genus MACROCHLAMYS, Bens.

amboinensis, Mart.

Genus LAMPROCYSTIS, Pfr.

ambonica, Boettg.

v. exigua, Boettg.

sinica, Mdff.

subangulata, Boettg.

Genus SITALA, H. Ad.

bandongensis, Boettg.

Genus KALIELLA, W. T. Blanf.

doliolum, Pfr.

Genus ENDODONTA, Alb.

Sub-genus ENDODONTA, s.s.

Section THAUMATODON, Pils.

philippinensis, Semp.

= philippinica, Boettg.

Genus PLANISPIRA, Beck.

zonaria v. fulminata, Mart.

2. ROZAGYN OR ROSENGAIN.

Genus HEMIPLECTA, Alb.

inquinata, v.d.B.*

o. MOLUCCAS (GENERAL ; PRECISE
HABITAT NOT RECORDED.)

Genus MICROCYSTINA, Mörch.

misella, Fér.

Genus PLANISPIRA, Beck.

Sub-genus PLANISPIRA, s.s.

zebra v. embrechtiana, Mouss.

iaddae, Pils.

chariessa, Pils.

Sub-genus CRISTIGIBBA, Can.

leptocheila, Can.

Genus PAPUINA, Mart.

lenta, Pfr.

Genus AMPHIDROMUS, Alb.

teysmanni, Pfr.

Genus HELICOSTYLA, Fér.

Section CRYSTALLOPSIS, Anc.

subvitrea, Pfr.

I. ARU ISLANDS.

Genus XESTA, Alb.

citrina, Linn.

luctuosa, Beck.

trochiscus, Pfr.

Genus MICROCYSTINA, Mörch.

misella, Fér.

Genus TROCHOMORPHA, Alb.

planorbis, Less.

Genus PLANISPIRA, Beck.

Sub-genus CRISTIGIBBA, Can.

tortilabia, Less.

Genus CHLORITIS, Beck.

Section CHLORITIS, s.s.

circumdata, Fér.

Section SULCOBASIS, Can.

sulcosa, Pfr.

rubra, Alb.

Section AUSTRORITIS, Pils.

occulta, Pfr.

Genus ALBERSIA, H. Ad.

zonulata, Fér.

Genus PAPUINA, Mart.

pileus, Müll.

blainvillei, Le G.

= gärtneriana, Pfr.

arrowensis, Le G.

leucotropis, Pfr.

a. WOKAN (OR VOKAN).

Genus MICROCYSTINA, Mörch.

aruensis, Can.
 Genus TROCHOMORPHA, Alb.
 demani, Can.
 Genus PLANISPIRA, Beck.
 Sub-genus CRISTIGIBBA, Can.
 semirasa, Mouss.
 tortilabia, Less.
 Genus CHLORITIS, Beck.

Section AUSTROCHLORITIS, Pils.
 occulta, Fér.

Genus ALBERSIA, H. Ad.
 zonulata, Fér.

Genus PAPUINA, Mart.
 pileus, Müll.
 blainvillei, Le G.

K. KEI OR KE ISLANDS.

Genus XESTA, Alb.
 citrina, Linn.
 campylonota, Can. Little Kei

Genus PLANISPIRA, Beck.
 Section CRISTIGIBBA, Can.
 semirasa, Mouss.

L. MYSOL.

Genus XESTA, Alb.
 citrina, Linn.
 Genus PLANISPIRA, Beck.
 Sub-genus CRISTIGIBBA, Can.
 semirasa, Mouss.
 = moluccensis, Pfr.
 Genus CHLORITIS, Beck.

Section CHLORITIS, s.s.
 circumdata, Fér.
 Section SULCOBASIS, Can.
 rubra, Alb.
 Genus PAPUINA, Mart.
 novoguineensis v. mysolensis, Pfr.

M. WAIGIOU GROUP.

a. WAIGIOU.

Genus XESTA, Alb.
 aulica, Pfr.
 v. gibbosa, Mart.
 Genus HEMIPLECTA, Alb.
 dura, Pfr.
 Genus PLANISPIRA, Beck.
 kurri, Pfr.
 Genus CHLORITIS, Beck.
 Section CHLORITIS, s.s.
 circumdata, Fér.
 Section SULCOBASIS, Can.
 concisa, Fér.
 Genus ALBERSIA, H. Ad.
 granulata, Q. and G.
 zonulata, Fér.
 Genus PAPUINA, Mart.
 turris, H. Ad.

aurora, Pfr.
 waigiouensis, H. Ad.
 wallaceana, Sykes.
 pyrgus, Sykes.
 Genus HELICOSTYLA, Fér.
 Section CRYSTALLOPSIS, Anc.
 conformis, Fér.

b. RAWAK.

Genus CHLORITIS, Beck.
 Section SULCOBASIS, Can.
 concisa, Fér.
 Section AUSTROCHLORITIS, Pils.
 argillacea, Fér.
 cristula, Fér.

c. GAGY OR GAGIE.

Genus PLANISPIRA, Beck.
 kurri, Pfr.

N. SERWATTY GROUP.

a. DAMMA.

- Genus XESTA, Alb.
dammaensis, Smith.
Genus MACROCHLAMYS, Bens.
pseudosuccinea, Smith.
dammeriana, Mdff.
Genus OTESIA, H. Ad.
cirrhotropis, Mdff.
Genus LAMPROCYSTIS, Pfr.
consueta, Smith.
Genus TROCHOMORPHA, Alb.

- timorensis, Mart.
Genus CHLORITIS, Beck.
dammaensis, Smith.
subcarinata, Mdff.
Genus EULOTA, Hartm.
subcornea, Smith.
Genus PLECTOTROPIS, Mart.
stenomphala, Mdff.
Genus HELICOSTYLA, Fér.
Section CORASIA, Alb.
tenimberica, Mdff.

O. TENIMBER (OR TIMOR LAUT).

- Genus EUPLECTA, Semp.
orientalis, Mdff.
Genus XESTA, Alb.
micholitzi, Mdff.
Genus HELICARION, Fér.
tenimbericus, Mdff.
Genus TROCHOMORPHA, Alb.
planorbis, Less.
Genus CHLORITIS, Beck.
Section CHLORITIS, s.s.
eurychasma, Boettg.
Section AUSTROCHLORITIS, Pils.
goniostoma, Mdff.

- telitecta, Mdff.
rhodochila, Mdff.
micholitzi, Mdff.
tenuitesta, Mdff.
Genus AMPHIDROMUS, Alb.
columellaris, Mdff.
Genus EULOTA, Hartm.
hemisphaerica, Mdff.
tenimberica, Mdff.
bitaeniata, Mdff.
Genus HELICOSTYLA, Fér.
Section CRYSTALLOPSIS, Arc.
tenimberica, Mdff.

SPECIES WHOSE PRECISE HABITATS HAVE HITHERTO
REMAINED UNKNOWN.

- Genus XESTA, Alb.
atrorubra, Less.
= ? citrina, var.
Genus HEMIPLECTA, Alb.
lennepiana, Pfr.
oblita, Pfr.
Genus TROCHOMORPHA, Alb.
valenciennesi, Le G.
= guilloui, Pfr.

ADDITIONS.

- BORNEO, p. 56.
Genus TROCHONANINA, Mouss.
kinabaluensis, Smith.
SULU ISLAND, p. 61.
Genus HELICOSTYLA, Fér.
Section CORASIA, Alb.
puella, v. lais, Pfr.

INDEX TO ISLANDS, ETC.

The references in Brackets indicate Islands not separately listed.

Adenara. G.h.	Kajau. H.c.6.	Pura. G.i.
Alor. G.k.	Kalantan. A.j.	Queda. A.h.
Amboyna. H.i.	Kalao. F.j.	Rakata. D.e.
Aru Is ^s . I.	Kaledupa. (F.g.)	Rawak. M.b.
Bakuit. (E. a.)	Karemon. E.j.	Riouw. A.c.
Balabac. E.b.	Kedah. A.h.	Rotti. G.m.
Bali. G.a.	Keffing. Is.H.1.	Rozagyn. H.n.2.
Bancâ. C.a.	Kei. K.	Salang. A.e.
Banda Group. H.n.	Kelantan. A.j.	Saleyar. F.h.
Banda Neira. H.n.i.	Krakatao. D.e.	Samauw. G.n.
Bangaya. F.e.	Labuan. E.h.	Samui. B.
Banguay. E.f.	Lesser Sunda. Is ^s .G.	Sangir. F.a.
Batchian. H.d.	Ligeh. A.k.	Saparua. H.k.
Batu. C.c.	Ligor. A.k.	Serwatty. N.
Bauluan. (F.h.)	Lombok. G.b.	Sibutu. E.g.1.
Bawean. D.b.	Madura. D.a.	Singapore. A.b.
Bilatan. E.g.2.	Makkian. H.c.5.	Sirhassen. E.l.2.
Biliton. C.b.	Malacca. A.a.	Solor. G.g.
Boneratu. F.k.	Malay Peninsula. A.	Sulu Group. E.g.
Bongao. E.g.4.	Mangsi. E.c.	Sulu Is. E.g.5.
Borneo. E.	Mareh. H.c.3.	Sumatra. C.
Buru. H.h.	Moluccas. H. & Ho.	Sumba. G.d.
Busuanga. E.e.	Morotai. H.b.	Sumbawa. G.c.
Buton. F.f.	Morti. H.b.	Sunda, Lesser. Is ^s . G.
Celebes. F.	Motir. H.c.4.	Talaur. F.e.
Ceram. H.g.	Murigi. (E.a.).	Talaut. F.b.
Christmas Is.D.g.	Mysol. I.	Tawally. H.e.
Damma. N.a.	Natuna Group. E.l.	Tawi-Tawi. E.g.3.
Dana. G.e.	Nawng Chik. A.l.	Tenimber. O.
Engano. C.d.	Obi. H.f.	Ternate Group. H.c.
Flores. G.f.	Ombai. G.k.	Ternate Is. H.c.i.
Gagy. M.c.	Palawan. E.a.	Tidor. H.c.2.
Gilolo. H.a.	Panalingoan. E.d.	Tiga. E.i.
Goram. H.m.	Pantar. G.j.	Timor. G.l.
Great Natuna. E.l.1.	Paragua. E.a.	Timor Laut. O.
Halmahera. H.a.	Penang. A.g.	Tomia. (F.g.)
Haruku. H.j.	Perak. A.f.	Tukan Bessi. F.g.
Jalor. A.m.	Popoli. D.c.	Tular. F.e.
Jampea. F.i.	Pottebakkers Is.H.c.3.	Vokan. I.a.
Java. D.	Princes Is.D.d.	Waigiou Group. M.
Johore. A.d.	Pulo Lankawa. A.i.	Waigiou Is. M.a.
Junk Ceylon. A.e.	Pulo Laut. E.k.	Wokan. I.a.
Kaioa. H.c.6.	Pulo Sungian. D.f.	Xulla. F.d.

(To be concluded.)

FIGURES AND DESCRIPTIONS OF SUPPOSED NEW
SPECIES AND VARIETIES OF ENNEA, MACROCHLAMYS,
COCHLOSTYLA, STROPHOCHEILUS (BORUS), ODONTOS-
TOMUS (MORICANDIA), LEPTOPOMA, CATAULUS,
COPTOCHEILUS AND TROPIDOPHORA.

By HUGH FULTON.

(Plate ix.)

Ennea oleacea, n.sp.

Pl. ix, fig. 9.

Shell oblong-oval, very slightly perforated, rather thin, whitish, shining; whorls $6\frac{3}{4}$, very convex, slowly and regularly increasing, first two smooth, remainder distinctly (under the lens) obliquely striated, suture of lower whorls narrowly but clearly margined; aperture oval; peristome white, thickened and narrowly expanded, broadened interiorly at point of insertion, margins connected by a thin callus.

Maj. diam. 12; alt. 22 millim.

Hab.—Ukani, German East Africa.

This shell belongs to the group of *E. ovoidea*, Brug., *obesa*, Gibbons, *minor*, Morelet, and *liberiana*, Lea. Its nearest ally is perhaps *E. obesa*, which is more elongate in form and has less convex whorls, the latter increasing much more rapidly than in *oleacea*.

Macrochlamys bathycharax, Godw.-Aust.

Pl. ix, fig. 6.

Macrochlamys bathycharax, Godwin-Austen: Ann. and Mag. Nat. Hist., 1888, p. 56.

Allied to *M. compluvialis*, Blanf., and *M. convallata*, Bens., it is like the former in regard to its deeply channeled sutural area, but both are larger and not nearly so depressed in proportion to size, the umbilicus being also more open in the latter species.

Dimensions of figured specimen, maj. diam. $11\frac{1}{2}$; alt. 5 millim.

The specimen figured, collected by Mr. Booley at Port Blair, which I at first supposed to be a new species, must be, I think, judging from the description only (my search for the type in Godwin-Austen's collection having been unsuccessful) his *M. bathycharax*, if not, I would propose to name it *M. subconvallata*.

***Cochlostyla delicata*, n.sp.**

Pl. ix, fig. 10.

Shell pyramidally ovate, very slightly perforate, shining, first two and last whorls pure opaque white, middle whorls yellowish with irregular oblique whitish stripes, inconspicuously obliquely striated, and with numerous impressed spiral lines; whorls 6, moderately convex, regularly increasing; suture impressed; aperture sub-ovate, interior white; peristome slightly thickened, behind the peristome is a dark brown band about 2 millim. wide which shows through inside of aperture as a bluish colour, and joins the brown margin of peristome, giving it the appearance of being broadly expanded.

Maj. diam. 19; alt. 40 millim.

Hab.—?

This distinct species (probably from New Ireland or New Britain) is allied to *C. hindei*, Cox, and *C. heimbürgi*, Brancsik.

It bears a superficial resemblance to some varieties of *C. calobapta*, Jonas.

***Strophocheilus (Borus) separabilis*, n.sp.**

Pl. ix, fig. 12.

Shell oblong-ovate, imperforate, yellowish-brown below, darker on embryonic whorls which are margined above with golden-yellow; whorls 5, rapidly increasing, embryonic portion consisting of $3\frac{1}{2}$ whorls, clearly marked off and obliquely striated except first whorl which is smooth, the last $1\frac{1}{2}$ whorls strongly malleated; aperture sub-ovate, brown within; peristome thickened and slightly expanded at basal and columellar margins, pinkish fading to whitish at point of insertion, margins connected by a very thin, well-defined, whitish callus.

Maj. diam. 36; alt. 63 millim.

Hab.—? (probably Peru).

Easily distinguished from other species known to me, by its strongly malleated surface and thin substance.

***Odontostomus (Moricandia) toleratus*, n.sp.**

Pl. ix, fig. 2.

Shell narrowly but deeply rimate or umbilicate, fusiform, rather thin, slightly polished, light yellowish brown with indentations darker, upper part almost smooth, lower whorls distinctly malleated and crossed by microscopic close-set impressed spiral lines only visible under the lens; suture of lower part sub-crenulate; whorls $8\frac{3}{4}$, slightly convex, tapering at the base, aperture narrowly oblong, interior with a blackish stripe bordering the peristome, and continued at back of columellar fold, white in the throat; peristome slightly pressed outwards, white mar-

gined, deflected backwards somewhat at basal termination, columellar portion gradually widening to point of insertion, margins connected by a thin transparent callus.

Maj. diam. 9; alt. 32 millim.

Hab.—Brazil.

This bears great resemblance to the figure of *O. willi*, Dohrn, but according to Dohrn's description that species is "*delicately and sharply striate longitudinally*," a character not present in our species. From *O. nasutus*, Mts., it can be distinguished by its strongly malleated surface and the absence of the rather conspicuous white spiral hair-lines seen in that species.

***Leptopoma placidum*, n.sp.**

Pl. ix, fig. 7.

Shell almost imperforate, subconical, thin, pellucid, light yellowish colour, ornamented by numerous somewhat interrupted narrow golden-coloured spiral bands, lower whorls with microscopic spiral waved striae, middle whorls with four more conspicuous thread-like keels; whorls $5\frac{1}{4}$, moderately convex, last rounded; aperture very oblique, subcircular, opaque white for a short distance within, then transparent; peristome expanded except at columellar margin which is much thinner and almost straight; operculum normal.

Maj. diam. 10; alt. 11 millim.

Hab.—S. Flores Island, lowlands under 500 ft. (Everett).

The narrow conical form of this species and the almost closed umbilicus distinguishes it at once from any other species known to me from that region.

***Leptopoma albicans*, n.sp.**

Pl. ix, fig. 5.

Shell globosely conic, narrowly perforate, white, sometimes with a pale reddish band at the periphery continued at suture above, apex reddish-brown, with usual microscopic waved striae, on middle whorls about seven or eight spiral threads; whorls $5\frac{3}{4}$, moderately convex above, last whorl subcarinate in front, last half rounded; aperture somewhat oblique, subcircular; peristome white, narrowly expanded all round, margins joined by a very thin callus; operculum normal.

Maj. diam. 10; alt. 11 millim.

Hab.—Sumba Island (Everett).

This neat little species of the same gross dimensions as the last described is nevertheless quite distinct, its spire is larger in proportion, its peristome smaller and less oblique, and it differs also in coloration and the carination of its last whorl.

Cataulus connectens, n.sp.

Pl. ix, fig. 4.

Shell fusiformly oblong, solid, narrowly perforate, dark reddish-brown; whorls $9\frac{1}{2}$, obliquely striated, lower slightly convex, earlier whorls almost straight, the last carinated at the base, aperture circular, pale reddish-brown within; peristome continuous, yellow, thickened and reflexed, an egg-shaped opening to basal canal. Operculum normal.

Maj. diam. (including peristome) $8\frac{1}{2}$; alt. 21 millim.

Hab.—Watawala, Ceylon (O. Collett).

Although closely allied to both *blanfordi*, Dohrn, and *decorus*, Bens., it can be readily separated from the former by its yellow peristome and from the latter by its smaller size, more slender form, and from both by the peristome being more in line with, or under, the whorls.

Cataulus greeni v. robusta, n.v.

Pl. ix, fig. 1.

Shell more solid than typical *greeni*, somewhat broader in form, the oblique striae and crenulations at suture ~~more~~ conspicuous, the notch on upper right margin of peristome varies from being almost entirely absent, to specimens having a small but clearly defined V-shaped one.

With reference to the distinct notch supposed to be characteristic of *greeni*, I have before me a specimen of the typical form from Punduloya, which scarcely shows the notch, thus demonstrating the instability of that character.

Maj. diam. $7\frac{1}{2}$; alt. 17 millim.

Hab.—Dimbula, Ceylon, 5,000 ft. (O. Collett).

Coptocheilus perakensis, n.sp.

Pl. ix, fig. 3.

Shell narrowly perforate, moderately solid, reddish-brown, spire elongately-conic, obliquely striated, last two whorls margined at the suture, whorls $7\frac{1}{2}$, slightly convex, aperture circular, brown within; peristome sub-duplicate, expanded, whitish, margins connected by a raised callus, somewhat angular at upper columellar portion; operculum normal.

Maj. diam. (including peristome) 11, long. 23 millim.

Hab.—Perak (Grubauer).

C. perakensis differs from *sectilabrum*, Gld., in having no notch or sinus on its peristome, which is thinner, and also by its less convex whorls; from *anostoma*, Bens., it is distinguished by its smaller aperture, less convex whorls, and its more elongated form. The name *Coptocheilus* being said to be preoccupied, Kobelt has proposed the name of *Schistoloma* for this group.

Tropidophora perfecta, n.sp.

Pl. ix, fig. 11.

Shell globosely turbinate widely umbilicated, solid, closely spirally and

obliquely striated on lower whorls, spiral striae wider apart and more conspicuous at umbilical area, yellow at apex, light brown below with numerous narrow spiral bands of a darker colour; whorls $5\frac{1}{2}$, rapidly increasing, very convex, last rounded; aperture sub-circular, moderately oblique, almost black within; suture crenulated; peristome white; moderately expanded and shortly reflected, almost continuous, slightly interrupted at place of attachment to whorl. Operculum normal.

Maj. diam. 29; alt. 23 millim.

Hab.—Fort Dauphin, Madagascar (Sikora).

In coloration this shell somewhat resembles *balteata*, Sowb., and *moulinsi*, Grat., but the latter is a much more depressed form and the former not so depressed; it may be readily distinguished from both by its expanded and reflected peristome and its almost black aperture contrasting so strongly with its white peristome.

***Tropidophora plurilirata*, n.sp.**

Pl. ix, figs. 8*a*, *b*.

Shell moderately umbilicate, globose-conic, rather thick, apex smooth, elsewhere covered with close-set spiral lirae crossed by fine oblique striae, about 40 on last whorl, yellowish brown, with rather indistinct oblique stripes of darker colour, sometimes with a narrow dark brown subperipheral band; whorls 5, convex, somewhat channeled at suture of middle whorls; aperture sub-oval, interior with brown spiral thread-like lines on a whitish ground; peristome slightly thickened and narrowly expanded, continuous, angled at upper part at point of attachment to last whorl; operculum normal.

Maj. diam. $16\frac{1}{2}$; alt. $16\frac{1}{2}$ millim.

„ „ (banded specimen) $15\frac{1}{2}$; alt. 16 millim.

Hab.—Near Grahamstown, Cape Colony (Miss Leppan).

The spiral lirae are much closer and more numerous than in any of the other S. African forms. *T. plurilirata*, *insularis*, Pfr., and *transvaalensis*, M. and P., are all similar in form and coloration.

EXPLANATION OF PLATE IX.

- Fig. 1. *Cataulus greeni* v. *robusta*, n.v.
- Fig. 2. *Odontostomus* (*Moricandia*) *toleratus*, n.sp.
- Fig. 3. *Coptocheilus perakensis*, n.sp.
- Fig. 4. *Cataulus connectens*, n.sp.
- Fig. 5. *Leptopoma albicans*, n.sp.
- Fig. 6. *Macrochlamys bathycharax*, Godw.-Aust.
- Fig. 7. *Leptopoma placidum*, n.sp.
- Fig. 8*a*, *b*. *Tropidophora plurilirata*, n.sp.
- Fig. 9. *Ennea oleacca*, n.sp.
- Fig. 10. *Cochlostyla delicata*, n.sp.
- Fig. 11. *Tropidophora perfecta*, n.sp.
- Fig. 12. *Strophocheilus* (*Borus*) *separabilis*, n.sp.

NOTES.

On the name *Lima elliptica*.—In 1863 Jeffreys described (Brit. Conch., vol. ii, p. 81) a shell from the British Seas under this name. Unfortunately the name had been used in August, 1861, by Whiteaves (Ann. Nat. Hist., ser. 3, vol. viii, p. 146) for a fossil from the "Corallian Oolites of Oxford." Under these circumstances, as I am unable to trace any other name applicable to the recent shell, I propose to name it *Lima gwyni*, nom. nov.—E. R. SYKES.

Note on a Malformed Specimen of *Ceratisolen legumen*.—It may be interesting to state that a short time ago I received a specimen of the above species exhibiting a curious state of development. Nothing is present in the growth of the shell to determine the cause of it, though there is a small deflection of the postero-ventral end of the left valve but this appears to have arisen subsequently through the imperfect growth of the mantle lobe.

The foot is abnormally large. The mantle lobes between the pedal aperture and the proximal parts of the siphon are exceedingly thin, and the pallial muscular bands along this portion are nearly altogether wanting. The free portions of both gills are only slightly developed and are very narrow.—H. H. BLOOMER.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xv (pt. 60), pp. 209–323, pls. 56–65. Philadelphia: Academy of Natural Sciences.

Continuing the account of the *Urocoptidae*, Dr. Pilsbry describes the following new species and varieties: *U. lavelleana* v. *trinidadensis* (Trinidad); *U. fraterna* (Western Cuba), like *U. capillacea* in shape and colour, but more coarsely striate, and the axis bears two spiral lamellae; *U. hidalgoi* v. *brevicervix*; *U. gonzalezi* (Western Cuba), similar to *U. hidalgoi*, but more tapering, neck short, and only one axial lamella; *U. joaquinii* (Western Cuba); *U. discors* v. *lagunillensis* (Western Cuba); *U. diaphana* (Western Cuba); *U. baculum* (Cuba); *U. ischna* (Western Cuba); *U. rugeli* v. *euglypta*; *U. bahamensis* v. *providentia* (Nassau); *Spirostemma bellewensis*, n.n. for *S. propinqua* (Vend.), non *S. propinqua*, Arango; and *S. ipswichensis*, n.sp., both from Jamaica.

In an Appendix the author gives a short account of the anatomy of *Anisospira townsendi*, hitherto known by the shell only. The generative organs resemble those of *Eucalodium* in the long vas deferens, the other characters being common to both *Eucalodium* and *Coeocentrum*. The genus is somewhat intermediate between these two genera. *A. recticosta* v. *townsendi*, Pils. and Ckll. is described as new.

The present part completes volume xv. and contains the contents, and

References to Plates. A key to the genera and subordinate groups of *Urocoptidae*, with a general discussion of the affinities and distribution of the family will form the Introduction to volume xvi, the first two parts of which will contain monographs of the remaining genera, and an Index.

Hedley, C.—Studies on Australian Mollusca. Part vii. Proc. Linn. Soc. N.S.W.; 1902, pp. 596–619, pls. xxix–xxxiii.

Mr. Hedley, in the seventh part of these Studies, discusses *Chione lagopus*, Lam., which name supersedes the *Venus australis*, Sby.; an interesting form of *Mactra* is figured and described under *M. abbreviata*, Lam., as a variety, but it appears likely that it will ultimately prove to be a new species. The new species described and figured are: *Purpura pseudamygdala*, *Assimineia pagodella*, *Caecum lilianum*, and eight species of *Triphora*. Notes on the nomenclature and distribution of many other molluscs are given, and figures of *Cylindrobulla fischeri*, A. Ad. and Ang., *Endodonta melbournensis*, Cox, *E. subdepressa*, Brazier, *E. otwayensis*, Petterd, and *E. tamarensis*, Petterd.

Kennard, A. S. and Woodward, B. B.—On the Occurrence of *Neritina grateloupiana*, Fér. (hitherto misidentified as *N. fluviatilis*), in the Pleistocene Gravels of the Thames at Swanscomb. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 320–321.

In 1901 the authors recorded *N. fluviatilis*, L., as occurring in countless numbers in a section of the high terrace gravel of the Thames, at Swanscomb. Examples of these have since been submitted to Dr. Boettger, who identifies them as *N. grateloupiana*, Fér. (= *crenulata*, Klein). The nearest living form is *N. danubialis*, Mf.

The occurrence of this species affords, as the authors point out, an extremely interesting example of the imperfection of the palaeontological record. On the Continent it is unknown in any deposit of later age than the Upper Miocene, in the Thames Valley it appears in the Pleistocene in countless profusion, and is unknown in any later deposits, while the living English species, *N. fluviatilis*, though known from the Miocene of Germany, is unknown in any deposit older than the Holocene in the British Isles.

Godwin-Austen, H. H.—Further description of the animal of *Damayantia carinata* Collinge, showing its similarity to *D. smithi*, Collinge and G. A., with remarks on this genus of Issel, *Collingea* of Simroth, and *Isselentia* of Collinge. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 311–316, pl. xi.

The author contends that the *Collingea smithi*, Clge. and G. A., and *Damayantia carinata*, Clge., are one and the same thing and that *Isselentia*, Clge., is probably a subgenus of *Damayantia*, Issel.

The differences between these three genera are so evident, both externally and internally that any confusion of them can only be due to either woeful ignorance, or a strange incapability to perceive and rightly appreciate their characters. But an author who has described the generative organs of the genus *Girasia* as “in every way similar to those of *Austenia*,” and those of *Austenia* as “very similar” to those of *Macrochlamys*, and those of the latter genus as “like species of *Oxytes*,” can scarcely expect his writings to be taken seriously.

Stiasny, Gustav.—Die Niere der Weinbergschnecke. Zool. Anz., 1903, Bd. xxvi; pp. 334–344, figs. 1–5.

After pointing out that not a few of the leading text-books are wrong in their account of the kidney of *Helix pomatia*, the author gives a detailed descrip-

tion of this organ, illustrated by capital figures. It consists of the kidney itself, the primary ureter, which latter extends from an aperture at the apex of the kidney to the posterior corner, and the secondary ureter, being the continuance from the posterior corner of the kidney to the external aperture.

Dean, Bashford.—Japanese Oyster-Culture. U. S. Fish Commis. Bull., for 1902, 1903, pp. 17-37, pls. 3-7, and 27 figs. in text.

The author gives an interesting account of the culture and living conditions of the Western Pacific oysters. There are three species of Japanese oysters, viz., a small one, probably a dwarfed salt-water variety of *Ostrea cucullata*, Born., the shell measures about two inches in length, the actual size of the oyster is, however, rarely larger than one's finger nail. The second form, *O. cucullata*, which seems the most important one from the culturist's standpoint, averages the size of a "Blue-Point," or of an English "native." The third form, *O. gigas*, Thunb., is of large size, specimens weighing with the shell 4 or 5 pounds, being not infrequent.

The cultural methods in various districts are described in detail, and the regulations imposed by the Japanese Government. The question of introducing and cultivating the Japanese oyster in the United States is next dealt with, and various practical suggestions are put forward.

Robert, A.—Récherches sur le développement des Troques. Arch. de Zool. exp. et gen., 1902 (3 ser.), T. x, pp. 269-538, pls. xii-xviii, tables xix-xlii.

Professor Robert, already well known for his admirable studies on the anatomy of the genus *Trochus*, here gives an exhaustive and detailed account of the cell-lineage and development of *T. magus*.

Ancel, P.—Histogénèse et structure de la glande hermaphrodite d'*Helix pomatia* (Linn.). Arch. de Biol., 1902, T. xix, pp. 389-652, pls. xii-xviii.

Kennard, A. S. and Woodward, B. B.—The Non-Marine Mollusca of the River Lea Alluvium at Walthamstow, Essex. Essex Nat., 1903, vol. xiii, pp. 13-21, figs. 1-3.

Smith, Herbert H.—An Annotated Catalogue of Shells of the genus *Partula* in the Hartman Collection belonging to the Carnegie Museum. Ann. Carnegie Mus., 1901, vol. i, pp. 422-485.

It is with feelings of deepest regret that we have to chronicle the decease of Dr. O. F. von Möllendorff, of Frankfurt-on-Main, whose death occurred on August 17th. His numerous writings on the Land Mollusca of Eastern Asia, and especially on those of the Philippine Islands, have added much to our knowledge of many little known Asiatic regions.

We hope to give a further account and portrait of the deceased in the December issue.—W.E.C.

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VOL. X.

ON THE RESPIRATORY AND LOCOMOTORY HABITS
OF AMPULLARIA GLOBOSA, SWAINSON.

BY V. V. RAMANAN, M.A., F.Z.S., ETC.,

TENALI, KISTNA DR., S. INDIA.

INTRODUCTION.

The following observations on *Ampullaria globosa*, Swainson, were made by me by experimenting with the Ampullarian in an aquarium specially constructed for the purpose, and they ranged over a period of nearly two years. At the same time I lost no opportunity of supplementing this method of study, by watching the behaviour of this species in its favourite natural haunts, in and about the city of Madras.

I may mention at the outset, that many of the observations here set forth are completely at variance with those of Fischer and Bouvier ⁽¹⁾, and Karl Semper ⁽²⁾, made on an allied species *A. insulorum*, d'Orb. Fischer and Bouvier would sometimes appear to contradict Semper and *vice versa*, while my own observations often disagree with those of one or the other, and less frequently with those of both. A number of other interesting points that I have been able to bring together respecting the floating and sinking habits of the Ampullarian, are not even alluded to by them. The discrepancies, in their observations, as compared with mine, must be ascribed to the different nature of the species with which they were working, viz., *A. insulorum*, d'Orb., but the serious disagreement between Semper and Fischer and Bouvier, as regards the same species,

1. I had no opportunity of consulting at first-hand Fischer and Bouvier's paper on the habits of breathing in *A. insulorum*, d'Orb., in Comptes Rend., cxi, pp. 200 *et seq.*, alluded to in Lang's Text-book of Comparative Anatomy (English Translation), vol. ii, p. 90, so I base my remarks on the summary given by Cooke, in the volume on Molluscs in the Cambridge Natural History Series p. 158.

2. Animal Life (International Sci. Ser.), pp. 191, 192, 448 and 449.

would seem to indicate that the results, of one of them at least, were not based on a prolonged and close examination of its life-habits. At the same time, my observations on the breathing, sinking, and floating habits of *A. globosa*, Swains., disclose facts which seem to be quite novel as regards the genus, for I have not found any writer making even a remote reference to them.

DESCRIPTION OF *A. GLOBOSA*, SWAINS.

I have thought it might be useful to give a description of the external form of the animal, chiefly because I have not seen a description elsewhere.

Body of a light brownish grey colour above, dotted over with spots of a brilliant black, edged with glowing yellow, and of a pale bluish or slate tint below. Muzzle stout and conspicuous, produced into two long tentacular processes. Tentacles proper, very long and tapering. Eyes prominently stalked. Two nuchal lobes, the left one forming a long siphon at the animal's pleasure. Respiratory cavity divided by a septum, the right chamber having a large monopectinate branchia, while that in the left is vestigial. The left chamber functions mainly as a pulmonary sac, when the animal indulges in aerial respiration. The shape of the foot is roughly triangular, with the angles bevelled and the apical portion situated posteriorly. The foot-sole is of a dirty yellowish hue.

RESPIRATORY AND LOCOMOTORY HABITS, ETC.

About every twenty minutes or so, the animal crawls to the surface from the bottom of the aquarium, ⁽³⁾ feeling its way for the air above the water-level by its long, lashing, tapering tentacles. When within an inch from the surface, it extends the siphonal tube formed by the curling over of its left nuchal lobe ⁽⁴⁾, thus bringing the orifice of the tube just above the water. Gradually and almost imperceptibly the orifice expands, until at last it comes to have a diameter of 15 millim., and concurrently with the expansion, the tube itself gradually shortens, and the aperture in the centre of the dividing wall between the lung and gill-sacs opens. The nuchal lobe thus diminishes in length, and after attaining the utmost limit of its expansion in breadth, unfolds in such a manner that it assumes the shape of a semi-circle, forming only the *lower half of the rim* of the siphonal orifice, while the other half of the rim is provided for by the basal part of the peristome, the body of the tube itself consisting solely of the pallial lobes. It is curious, that this phenomenon is not mentioned either by Semper or by Bouvier and Fischer. From what they state, one would be led to understand that the siphonal tube undergoes no change at the surface beyond elongation and amplitude. On the

3. My Aquarium was a small glass tank 2½ feet square.

4. In discussing the breathing habits of *A. insulorum*, d'Orb., Prof. Semper tells us that the elongated tube is formed by an incurving of the margin of the mantle. If he means by mantle, the pallial lobes as distinct from the cervical lobes, the observation is not applicable to our Madras species. Vide Semper: Animal Life, pp. 413 *et seq.* Of course the pulmonary chamber which becomes the main part of the tube at a later stage, is made up of the pallial lobes.

contrary, the chief feature in the breathing process of our species lies in the fact that the siphonal tube, after it has reached the top, increases enormously in calibre at the expense of length. The orifice maintains this diameter, as a rule, till the completion of the aerial respiration, and slowly contracts afterwards till the lumen comes to be only 5 millim. in diameter. Bouvier and Fischer make out that *A. insulorum*, d'Orb, the same species with which Semper experimented, produces in the pulmonary sac movements of ex- and inspiration, by alternately raising and depressing its head in much the same manner as the Cetacea. But this does not occur in the Madras species. The breathing-in is a process of complete suction, induced or occasioned by the dilatation of the pallial cavity, which, in the absence of aerial respiration, is completely shrivelled up. So far from ever moving its head at all, it lies perfectly quiet, keeping its tentacles loose and motionless, curled either round the margin of the foot or within the constriction between the podial region and the shell. The siphon meanwhile regains its original length, the animal closes the aperture in the oblique septum between the pulmonary sac and the branchial cavity, lowers the siphon and admits water into it for aquatic breathing. Professor Semper, in respect to the aquatic respiration immediately following the aerial one, at the surface of the water, says that the *A. insulorum*, d'Orb., "reverses the margin of the mantle, opening the tube into which the water streams." So far as I have been able to make out, there is no reversion of the rim of the pallial lobes at all in *A. globosa*, Swains. What takes place is briefly this. The extremely broad orifice through which air enters, becomes somewhat contracted, the siphon regains its length by the infolding of the nuchal lobe, and is lowered bodily under the water, and aquatic respiration begins. Another change is restricted to the circular aperture in the roof of the mantle-cavity, communicating with the pulmonary chamber above. It closes when the aerial respiration is over and the animal lets down the siphon. To see this aperture in the living state, one has to suddenly seize an animal crawling on land, and before it has had time to close its operculum, to force the latter the other way, when a circular opening in the septum (lower wall of the pulmonary sac) can be seen, contracting and expanding. As a rule, the animal does not absolutely close the siphonal orifice when lowering it under water, only the diameter of the orifice is lessened. But it closes it at once, if, on account of some external disturbance, it is obliged to suddenly sink to the bottom. The explanation of this is simple : it wants to avoid the ingress of water, through the unclosed aperture in the septum, into the pulmonary cavity, and therefore completely shuts the siphon. There is no doubt that this contraction and expansion of the aperture which takes place when the animal is on land, or when it is in water respiring air, has a respiratory significance. And when the siphonal orifice is diminished in size, and then lowered into the water, it is probably to suit the exigencies of aquatic breathing. After a time, the animal again extends its siphon above the

water, opens the aperture in the roof of the mantle-cavity, repeats all the processes above-noted, and thus prepares itself for breathing air, only still later to reduce the diameter of the orifice in a few minutes and lower down the siphon to respire water. This alternation of aerial and aquatic respiration takes place for from 11 to 12 minutes at the surface of the water, and finally, the animal closes its operculum and sinks to the bottom.

At the surface of the water, alternate respiration is not always the rule. The animal may indulge in aerial respiration alone, to a complete exclusion of aquatic breathing. Altogether three modes of respiration can be recognised in the animal's life-habits. They are (i) complete aquatic respiration when the animal is under water; (ii) complete aerial respiration when it is on land; (iii) rapid alternation of water breathing and air-breathing when it is at the surface of the water. And it is common to find it also (i) at the bottom of the water, without any breathing; (ii) on land, without any breathing; (iii) at the surface of the water, either breathing air alone, or water alone, or doing no respiration. In these cases of non-breathing, the animal feigns death for a few minutes, sometimes a few hours even, and then resumes respiration.

When the animal is in its usual surroundings, the following may be taken to be the normal cycle of its movements for purposes of respiration:—

ON THE BOTTOM.⁽⁵⁾—The animal lazily crawling and indulging in aquatic respiration, 5 minutes.

IN MIDWATER.⁽⁶⁾—Vigorously crawling to reach the top. Aquatic respiration, 3 minutes, 3 seconds.

AT THE TOP.⁽⁷⁾—Alternation of aerial and aquatic respiration, 11½ minutes. 6 aerial respirations at 1½ minutes each. 6 aquatic respirations at 25 seconds each, falling to the bottom after closing its operculum⁽⁸⁾ 2 seconds.

Of the above observations, some are not in agreement with Semper's, while a few others do not fit in with those of Bouvier and Fischer, who, however, were working with a different species of *Ampullaria* (*A. insulorum*, d'Orb.), that has its home in the Malay Archipelago and elsewhere.

Being decidedly Amphibian in its habits, the animal is occasionally found taking short trips to the land, away from the watery surroundings. It is sometimes unwilling to return to the water for days together. On its

5. When on the bottom, the animal may occasionally be found at rest with its operculum shut for hours, and sometimes for days together. Whether respiration is going on in any latent fashion or is temporarily suspended at that time, it is impossible to say. The oxygen stored up in the pulmonary cavity might perhaps be then sufficient for the low metabolism.

But when crawling on the bottom, bubbles of gas sometimes collect round the siphonal edge. These may either be carbonic acid gas given off by the lung or the branchial sac, or the atmospheric air retained in the pallial cavity for pneumatic purposes. The siphonal aperture is of moderate size and uniform in shape.

6. 3 minutes and 3 seconds is the time it takes for getting up my aquarium, which measures 1 foot and 2½ inches high.

7. When the animal indulges in complete aerial respiration at the surface of the water, the siphonal edge can often be seen contracting and expanding rhythmically and sometimes lying in a uniformly extended state for minutes together. This contraction and expansion may correspond to the expiratory and inspiratory processes of respiration.

8. Instead of sinking, it may occasionally crawl down.

trips to land, it may either be found crawling or at rest with the operculum closed. If it should be crawling, it keeps the siphon fully expanded, and breathes air. We can at the same time see the circular aperture in the lower wall of the pulmonary sac, opening and contracting, as well as the siphonal orifice in rapid alternation. The contractions and expansions taken together average 12 a minute. The expansion is twice as rapid as the contraction. When it is at rest, it is difficult to say if it breathes or not (see note above). Both in this condition and in that mentioned in footnote 5, it is almost certain that metabolism is very low, and that respiration, if any, is extremely feeble. The operculum is so hermetically closed that no air can possibly get in.

I have occasionally seen the animal floating on the surface of the water, with its foot and tentacles spread out. When in this posture, it keeps its siphonal orifice closely shut without exhibiting either sort of breathing. There is no doubt that in order to float like this the animal must, in the first instance, fill its pallial cavity with air. And that this is actually the case, I have ascertained by giving a severe blow with the finger on the shell, when the animal was floating at ease. It at once went down on account of the blow, and as it sank, gave off a series of bubbles which burst as soon as they reached the surface, thus proving the presence of air in the mantle-cavity.

If we do not, on the other hand, disturb the animal when it indulges in this indolent floating, after 10 minutes or more, it either attaches itself to some plant or other object near at hand, and begins taking in air or water, or sinks to the bottom with its foot fully extended, its tentacles spread out, and its elongated siphon closed. I did not find the slightest alteration of form in the tentacles, siphon or foot. No bubbles of air are given off either when it reaches the bottom or afterwards.

The animal, strange to say, is not able to float from the bottom to the surface, however extended it may keep its body, showing thereby that it is not able to displace a sufficient volume of water to proportionately lessen its weight. This fact seems to contradict my first observation that the animal in a fully expanded state is able to float on the surface of the water, and I am unable to explain the apparent discrepancy.

Thus, whenever the Ampullarian wants to ascend to the surface, it invariably crawls, but when descending, it may either crawl, fall straightway to the bottom after closing its operculum, or, more rarely, may float down. Whenever the animal falls, by suddenly closing its operculum, either voluntarily or on account of interference, bubbles of air are given off; but not when it crawls or slowly sinks down. Of course, the animal, when roaming undisturbed under water, gives off now and then one or two bubbles (foot-note 5); and these are to be carefully distinguished from the series of bubbles given off by the animal, when it is forcibly pushed down. There is little doubt that the Ampullarian keeps within its body some air for pneumatic needs. If we take, for instance, an animal lying

at the bottom of the aquarium and put it suddenly in hot water, it gives off a series of bubbles before dying. The same thing also happens in the case of an animal which has been long out of water. An interesting point in the animal's ascent is that it is able, despite its bulk, to trust itself safely to the very delicate stems or leaves of aquatic plants. These never bend or move from side to side when it is ascending, and it is probable that its expanded condition contributes to the feat. The plants are so thin that, but for the elaborate hydrostatic adjustment of the animal in spreading out its body, they would otherwise bend or give way under the weight of such a heavy body. We must at the same time remember that the animal uses its discretion in making a distinction as to its manner of movement, whether it shall crawl up hard objects, such as the inner side of the aquarium, stones, etc., or ascend the flexible stems of aquatic plants. In the one case, it keeps its foot and tentacles normally spread out, while in the other it produces them to an extraordinary extent, and keeps the body greatly expanded in order to lessen its weight in the water as far as possible, and in order to ascend the leaves of the most delicate and fragile plants, without swaying to one side or the other. In such cases it is easy to observe the laborious caution the animal takes, lest it should slip down. I have found in the aquarium Ampullarians ascending clusters of leaves as easily as single ones. When they ascend collections of leaves, they do so without difficulty. But when they climb a single leaf or stem, they take the utmost precaution, expand their bodies to the greatest limit, and progress gradually. But the most interesting point of all, lies in their careful efforts to extend the foot into a thin leafy expansion and engulf the long narrow leaf or stem within it.

And now marshalling, in conclusion, all the facts we have been able to gather respecting Ampullarian locomotion in water, we get three groups of phenomena, which may be put as follows :--

I.—FLOATING ON THE SURFACE OF THE WATER.

- (A.) *Active*.—Body thoroughly extended or only extended partially. Goes down when disturbed.
- (B.) *Passive*.—Body only partially extended. Nothing short of a sharp prick will make the animal close the operculum and sink. A hard knock on the shell with a heavy nail, sends it down, but as soon as the impulse is exhausted, it floats. The animal behaves like a dried cork immersed in water.

II.—DESCENDING TO THE BOTTOM BY

- (A.) *Sinking*.—By suddenly withdrawing all the soft parts, closing the operculum and giving off a series of bubbles. This may either be (i) Voluntary, or (ii) Involuntary, when necessitated by any external interference or injury.

- (B.) *Sinking Slowly*.—With all the soft parts well-protruded, or only slightly retracted. Not a single bubble is given off.
- (C.) *Crawling*.—All the soft parts normally extended, and no air-bubbles given off.

III.—RE-ASCENDING BY MEANS OF CRAWLING.

- (A.) *Up hard objects*.—Body normally extended.
- (B.) *Up fragile stems or leaves*.—A sort of acrobatic progression, carried out with the greatest deliberation. Body extraordinarily spread out.

Judging from the massive nature of the animal's body, one or two explanations seem at first sight necessary to interpret its widely-diverging modes of locomotion : (A) the animal is able to determine its pneumatical adjustments at particular levels of the water, by secreting the needed amount of air from its own tissues, or (B) it is able to inflate itself with the required quantity, deriving it from either (a) the air which is found dissolved in the water, or (b), the atmospheric air above the water-level. But when closely examined in the light of facts, both of these suppositions fail. For if (A) and (B), (a) were true, it is hard to understand why the animal is not able to float to the surface, but tries to reach it by laboriously crawling up the inner side of the aquarium, or up the plants that may be living in it. (B) (b) breaks down, if we keep in mind the fact that when slowly sinking to the bottom, there is neither the retraction of soft parts, nor the extrusion of bubbles of air, which this theory requires. Thus, it can be shown that a hypothesis which accounts for one set of facts, does not hold good for the other. Another strange fact to crown the confusion with regard to both (A) and (B), is that the animal is unable to float on the under-surface of the water as *Bythinia* and *Lymnaea* are capable of doing. We see, therefore, that the whole phenomenon of Ampullarian locomotion, from the firm adherence of its foot to smooth surfaces, and its slow but steady progression at the surface of the water, down to its mysterious want of power to float to the surface of the pond or aquarium, suggest a series of problems in zoo-mechanics which need thorough investigation. The subject is one also, that does not seem to have been taken up by any of those specialists, who have made the subject of animal mechanics their particular study.

THE ANATOMY OF PHARELLA ORIENTALIS, DUNKER AND TAGELUS RUFUS, SPENGLER.

By H. H. BLOOMER.

(Plate x.)

I wish first to acknowledge my indebtedness to the director of the Natural History Department of the British Museum, Professor E. Ray Lankester, F.R.S., and to Mr. Edgar A. Smith, I.S.O., by whose courtesy I have been enabled to examine a specimen of each of the above species.

Pharella orientalis, Dunker.

EXTERNAL CHARACTERS.

The specimen measures 14.5 c.m. long, 4.7 c.m. deep, and along the dorsal surface is slightly curved upwards. The mantle lobes from a position over the posterior part of the anterior adductor muscle, take a deep curve and pass some distance posteriorly before their concrescence, thus the pedal aperture though lying anteriorly extends over the anterior adductor muscle, and on the ventral surface still further posteriorly. The muscles of the pallial edge (Fig. 1, *P.M.*) form a deep band, and the exterior margins of the lobes are crenulated all round them. The periostracum passes from the pallial edges to the valves of the shell and is abundant at the posterior end. The flaps on the mantle lobes bordering the pedal aperture are very narrow. There is no fourth aperture. The proximal portion of the siphon is strongly developed, while the free portions are extremely short. The tentacles bordering the siphonal openings are very long, particularly the outer ones (Fig. 1, *S.T.*), some measuring as much as 8 millim. long. The smaller tentacular fringe extends a considerable distance anteriorly along the concresced portion of the mantle lobes, both dorsally and ventrally.

The foot (Fig. 1, *F.*) is long, of a nearly uniform depth and axe-shaped at the distal end.

The retractor pedis posterior muscle (Fig. 1, *P.R.P.*) is long, thereby shortening the distance between the posterior adductor and the siphon. At the posterior end the inner parts of the bases of the gills are joined together for about only one-third of the distance between the siphon and the foot.

The labial palps are relatively short and wide, the outer ones being especially wide.

MUSCULATURE.

i. *The Pallial Muscles* (Fig. 1, *P.M.*).—These form a deep band round each mantle lobe, and ventrally lie chiefly at right angles to the pallial edge. They obtain their maximum thickness at the line of adhesion to the valves of the shell. At the posterior end they form the proximal siphonal portion and are much more strongly developed (Fig. 1).

The anterior adductor muscle (Fig. 1, *A.A.*) is a large and nearly circular muscular plate, joined dorsally and anteriorly with the dorsal integument and mantle lobes, and posteriorly with the foot by the muscular ventral integument.

The posterior adductor muscle (Fig. 1, *P.A.*) is a large and deep plate of muscles, curving anteriorly and posteriorly towards the flattened dorsal surface. Anteriorly it is connected with the retractor pedis posterior muscle, and posteriorly with the proximal portion of the siphon and the dorsal integument.

ii. *The Pedal Muscles.*—The muscular arrangement of the foot is similar to that of *Solen* and is strongly developed. The three kinds of muscles found in this genus are also present, but in *Pharella orientalis* there is a large increase in the number of rows of the transverse muscles. Briefly, on each lateral side are two groups of longitudinal muscles, and between these there is a semi-circular band passing from the dorsal to the ventral surface. Between the two inner and much larger layers of longitudinal muscles, are a number of rows of transverse muscles, the fibres of which pass through the longitudinal muscles to the semi-circular layers, and they either continue, or other muscular fibres pass from these latter through the outer longitudinal bundles to the muscular pedal integument.

The pedis retractor anterior muscles (Fig. 1, *P.R.A.*) are short and thick, and in the foot proceed mostly in a postero-ventral direction over instead of under the longitudinal pedal muscles. There does not appear to be any bifurcation of the free portions.

The pedis retractor posterior muscle (Fig. 1, *P.R.P.*) is a comparatively long muscle, narrow at the sides and increasing in depth towards the median line. The bifurcated parts are short and connected with the posterior adductor muscle. Anteriorly the muscle continues as a portion of the longitudinal muscles of the foot.

ALIMENTARY CANAL.

The lips (Figs. 1, 2 and 3, *A.L.* and *P.L.*) formed by the union of the labial palps are wide, especially the upper or anterior one, which is of considerable width. The oesophagus (Figs. 2 and 3, *Oe.*) first runs a little dorsally, then turns posteriorly and opens into the stomach.

The stomach (Fig. 1, *St.*) is a long and irregularly shaped sac, consisting of a number of divisions which, for convenience, I have termed Anterior-oesophagael, Posterior-oesophagael, Cardiac, Central, and Pyloric.

The anterior oesophageal division (Figs. 2 and 3, *A.Oe. St.*) is long and narrow and divided from the posterior oesophageal one by a muscular ridge passing round the stomach.

The posterior oesophageal division (Figs. 2 and 3, *P.Oe. St.*) lies between the anterior oesophageal and the pyloric divisions. At its posterior end is the central division (Fig. 2, *C.D.*) bordered by a muscular ridge (Fig. 2, *C.D.R.*).

The dorsal side of this ridge is more developed and represents the muscular papilla of *Solen* (Fig. 2, *M.P.*). It separates the central from the cardiac division (Figs. 2 and 3, *C. St.*). Continuous with it is also a ridge (Fig. 2, *Oe. C.R.*) which divides the posterior oesophageal from the cardiac division. In the anterior part this muscular tissue extends right across, thus completely separating these two divisions.

The pyloric division (Figs. 2 and 3, *P. St.*) is large and occupies the whole of the posterior portion of the stomach. On the right side is a muscular ridge (Fig. 3, *P.D.R.*) running from the posterior oesophageal ridge nearly round this pyloric division. The ventral portion of the pyloric division narrows and continues as the caecum of the crystalline style (Figs. 1, 2, and 3, *C.C.*). The caecum is very long and large. It first passes ventrally, then curving, extends a considerable distance along the pedal cavity.

The intestine (Figs. 1 and 3, *In.*) leaves the ventral surface of the left anterior part of the pyloric division, the typhlosole commences, and the intestine proceeds first a little anteriorly, curves, and goes ventrally running just anterior to the caecum of the crystalline style, from which it is separated by a row of transverse muscles. It then turns anteriorly and forms a number of large folds, in the last of which the typhlosole disappears and the intestine proceeds posteriorly, passing over the right side of the caecum, then going dorsally, passes in a large loop over the posterior part of the pyloric division, and turning posteriorly continues as the rectum (Fig. 1, *R.*). It is shortly afterwards encircled by the ventricle (Fig. 1, *V.*), then passes over the posterior adductor muscle into the exhalant siphonal chamber, terminating in a bi-lobed anus (Fig. 1, *A.*).

The liver (Fig. 1, *L.*) lies laterally, ventrally, and partly dorsally around the stomach. The large bile duct enters on the ventral surface of the posterior oesophageal division and the smaller bile duct into the central division.

CIRCULATORY SYSTEM.

Apparently closely resembles that of *Solen*.

As regards the gill structure, Dr. Ridewood⁽¹⁾ states:—"In the five species of *Solen* examined the lamellæ are heterorhabdic and plicate, the plication being shallower in *Solen orientalis* than in the others. The numbers of filaments in a plica are nearly the same in the two demi-

1. Phil. Trans. Roy. Soc., 1903 (ser. B), vol. 195, pp. 147-284.

branches and run approximately 26 in *Solen vagina*, 17 in *Solen ensis*, 12 in *Solen fonesi*, 22 in *Solen (Solena) rudis* and 16 in *Solen (Pharella) orientalis*. . . . The two or three filaments at the apex of the plica are enlarged in *Solen fonesi* and *Solen orientalis*. . . . In *Solen orientalis* there is every gradation from a shallow frontal groove to a shallow frontal ridge, even in filaments cut at the same horizontal level. In all five cases the frontal groove disappears at the ventral edge of the demibranch, where the principal filament presents a distinct frontal ridge."

NERVOUS SYSTEM.

The cerebro-pleural ganglia lie lateral to the mouth, under the retractor pedis anterior muscles, and between them and the ventral integument. The commissure connecting the two ganglia goes in front of the mouth. Each ganglion apparently gives rise to only one anterior nerve, the anterior pallial nerve, which passes gradually outward to the postero-ventral edge of the anterior adductor muscle, but divides shortly before reaching it, the inner branch going underneath and innervating the muscle, the outer one passing across the mantle lobe and again dividing, the anterior part once more proceeds and divides; both branches join the outer circumpallial nerve, while the posterior part goes posteriorly as the inner circumpallial nerve.

Posteriorly each cerebro-pleural ganglion communicates with the visceroparietal ganglion by a connective. The connective first proceeds between the retractor pedis anterior muscle, and the pedal wall, then emerging, runs between the latter and the viscera, and, reaching the anterior portion of the retractor pedis posterior muscle, passes through the pedal integument to the lateral surface of the muscle and then underneath to the visceroparietal ganglion.

The cerebro-pedal connective leaves the cerebro-pleural ganglion on the inner side of the cerebro-visceral connective, and passing partly through and then along the pedal muscles, gives off a nerve to the viscera and afterwards joins the pedal ganglion.

The pedal ganglia are situated in the centre of the foot, midway between the dorsal and ventral surfaces, just over the anterior end of the anterior folds of the intestine. The ganglia give off on each side a number of nerves which innervate the foot.

The visceroparietal ganglia are situated under the posterior adductor muscle. From each ganglion arises a branchial nerve which first goes some distance anteriorly and curving outwards passes to the gills. Posteriorly each visceroparietal ganglion gives off a nerve, the posterior pallial nerve. It passes latero-posteriorly across and under the posterior adductor muscles, then there arises from it a nerve which crosses the mantle lobe and joins the inner circumpallial nerve, and afterwards the outer circumpallial nerve. The main nerve goes along the proximal

portion of the siphon, innervating it and the dorsal integument, and apparently joining the outer circumpallial nerve.

Tagelus rufus, Spengler.

EXTERNAL CHARACTERS.¹

The specimen measures 5.7 c.m. long and 2 c.m. deep. The mantle lobes (Fig. 4, *M.L.*), which take a slight curve forwardly from the anterior margin of the anterior adductor muscle, are not coneresced along their ventral surface, but are joined together below the extreme siphonal end by a round transverse muscle (Fig. 4, *M.C.*), the ends adhering to the valves of the shell, and thus resembling the adductor muscles, consequently the pedal aperture extends from the anterior adductor muscle to the siphon. There is no fourth aperture. At the posterior end the mantle lobes proceed some distance beyond the proximal portion of the siphon, giving off close to their posterior edges lateral processes (Fig. 4, *P.L.P.*) which encircle and are connected, with the siphon, thus completely enclosing the posterior end of the pallial chamber.

The teeth of the shell are not very prominent, and do not penetrate into the viscera as in *S. strigillatus*. The proximal portion of the siphon is short, while the free portions (Fig. 4, *In. I'* and *Ex. S'*) are of considerable length, the exhalent being longer than the inhalent one, but the openings by which they communicate with the pallial chamber are small. Large siphonal retractor muscles (Fig. 4, *S.R.M.*) are present and from a large surface adhere to the valves of the shell. The edges of the mantle lobes and the siphon are not characterised by carrying a tentacular fringe. The foot (Fig. 4, *F.*) is large, comparatively short, and very deep. The inner parts of the bases of the gills are joined together.

MUSCULATURE.

i. Pallial Muscles.—The muscles of the pallial edge commence at the anterior adductor muscle as a deep band. This band, after taking a slight curve, anteriorly, passes posteriorly and gradually decreases in depth until it reaches the proximal siphonal end, where the two mantle lobes are joined together by a round transverse muscle, the musculus cruciformis (Fig. 4, *M.C.*) described by von Ihering⁽²⁾, and stated by him as being an important character of the super-family *Tellinacea*, confirming the views of Dall. He believes this cruciform muscle is a special development of the fibres of the mantle edge, and functionally may serve as a secondary adductor.

The siphonal retractor muscles (Fig. 4., *S.R.M.*) run a short distance anteriorly along the mantle lobes, they pass through them, and spreading

2. Proc. Acad. Nat. Sci. Philad., 1900, pp. 480, 481, 2 figs.

out dorsally and ventrally, extend in a deep semi-circular direction, forming large surfaces from which they adhere to the valves of the shell.

The anterior adductor muscle (Fig. 4, *A.A.*) is a plate of muscles of greater length than depth, and divided into two unequal parts by the ventral integument passing between them to the dorsal surface. Anteriorly the muscle is connected with the mantle lobes, and posteriorly with the pedal and the dorsal integument.

The posterior adductor (Fig. 4, *P.A.*) muscle is a deep plate of muscles flattened anteriorly, and from this side is joined with the bifurcated parts of the retractor pedis posterior muscle and dorsal integument, and at the posterior side with the proximal portion of the siphon, the *dorsal integument and the mantle lobes*.

The pedis retractor anterior muscles (Fig. 4, *P.R.A.*) run ventrally, apparently over the longitudinal pedal muscles. There is no bifurcation of their free parts.

The pedis retractor posterior muscle (Fig. 4, *P.R.P.*) is very narrow and of considerable length, the posterior parts of the bifurcated portions being connected with the posterior adductor muscle.

From the specimen examined it was not possible to trace the pedis elevator or branchial retractor muscles, present in *S. strigillatus*.

ALIMENTARY CANAL.

The lips (Figs. 5 and 6, *A.L.* and *P.L.*) formed by the junction of the labial palps, point anteriorly. The oesophagus (Figs. 5 and 6, *Oe.*) is very short, it passes posteriorly and soon opens into the stomach. In shape the stomach (Fig. 4, *St.*), though similar to that of *S. strigillatus*,⁽³⁾ is longer, shallower, and the divisions are not so pronounced. I have, however, used the same terminology for the respective divisions. In the left part of the stomach and anterior to the centre lies the central division (Fig. 5, *C.D.*), bordered by a muscular ridge (Fig. 5, *C.D.R.*), which on its dorsal side is developed into a muscular papilla (Fig. 5, *M.P.*). From this central ridge, proceeds another one (Figs. 5 and 6, *A.D.R.*) which separates the dorso-central from the anterior division, then passing around the stomach in an irregular manner, divides the anterior from the posterior division.

The anterior (Figs. 5 and 6, *A.D. St.*) is larger than the posterior division (Figs. 5 and 6, *P.D. St.*), and its dorsal surface consists of a very muscular layer. The dorso-central division (Fig. 5, *D.D.*) is shallower and not so readily distinguished. The posterior division (Figs. 5 and 6, *P.D. St.*) is larger, depressed dorsally, and deeper at the posterior end.

From its ventral surface proceeds the caecum of the crystalline style (Figs. 5 and 6, *C.C.*), which goes ventrally, then curving terminates near the dorsal surface of the pedal cavity. As in *S. strigillatus* the intestine

3. Journ. Malac., 1903, vol. x, p. 36.

(Fig. 5, *In.*) is only partly separated from the caecum and appears as an irregular groove on the side of the latter. Near the distal end of the caecum the intestinal walls unite, thus completely enclosing it. The intestine (Fig. 4, *In.*) returns along the dorsal surface, and becoming free passes to the posterior part of the proximal portion of the foot, and makes a large number of folds (Fig. 4, *F.In.*) at and over the posterior division, then turning posteriorly continues as the rectum (Fig. 4, *R.*). It passes round the posterior adductor muscle, and on the postero-ventral surface ends at the anus (Fig. 4, *A.*). The liver (Fig. 4, *L.*) surrounds the anterior portion of the stomach with a considerable part lying underneath it. The large bile duct enters on the ventral surface of the anterior division, just in front of the intestine, and the smaller bile duct into the central division.

CIRCULATORY SYSTEM.

The circulatory system generally resembles that of *S. strigillatus*.

As regards the structure of the gills, Dr. Ridewood remarks ⁽⁴⁾:

"The gills of the three species of *Solenocurtus* examined agree tolerably closely in their general structure. The lamellæ are highly plicate, the plicæ being flattened antero-posteriorly so as to resemble the leaves of a book. The number of filaments in a plica are about 30 in the outer and 40 in the inner demibranch in *Solenocurtus strigillatus*, and *Solenocurtus (Tagelus) rufus*, while in *Solenocurtus (Macha) philippinarum* the numbers are about 24 and 30. In *Solenocurtus rufus* all the interlamellar septa rise high up the demibranch but in the other two species alternate septa are of small vertical extent. *Solenocurtus rufus* also has in the apex of the plica, a blood tube which is not noticeable in the other two."

NERVOUS SYSTEM.

The nervous system is very similar to that of *S. strigillatus*, the chief differences being in *T. rufus*, a smaller number of branches of the posterior pallial nerves and more particularly the absence of the large ones crossing the siphonal retractor muscles.

REFERENCE LETTERS.

<i>A.</i>	Anus.	<i>C.C.</i>	Caecum of the crystalline style.
<i>A.A.</i>	Anterior adductor muscle.	<i>C.D.R.</i>	Muscular ridge bordering the central division of the stomach.
<i>A.L.</i>	Anterior or upper lip.	<i>C.D.</i>	Central division of the stomach.
<i>A.D.R.</i>	Ridge separating the anterior from the other portion of the stomach.	<i>C.St.</i>	Cardiac division of the stomach.
<i>A.D.St.</i>	Anterior division of the stomach.		
<i>A.Oc.St.</i>	Anterior oesophagael division of the stomach.		

4. *Op. cit.*

<i>D.D.</i>	Dorso-central division of the stomach.	<i>P.A.</i>	Posterior adductor muscle.
<i>Ex.S.</i>	Proximal portion of the exhalant siphonal chamber.	<i>P.D.St.</i>	Posterior division of the stomach.
<i>Ex.S'.</i>	Free portion of the exhalant siphonal chamber.	<i>P.L.</i>	Posterior or lower lip.
<i>F.</i>	Foot.	<i>P.M.</i>	Muscles of the pallial edge.
<i>F.In.</i>	Folded portion of the intestine	<i>P.D.R.</i>	Muscular ridge of the stomach running from the oesophagael ridge nearly around the pyloric division.
<i>H.</i>	Point where the dorsal integument is connected with the teeth of the shell.	<i>P.L.P.</i>	Lateral processes from the posterior edges of the mantle lobes, which encircle and are connected with the siphon.
<i>In.</i>	Intestine.	<i>P.Oc.St.</i>	Posterior oesophagael division of the stomach.
<i>In.S.</i>	Proximal portion of the inhalant siphonal chamber.	<i>P.R.A.</i>	Retractor pedis anterior muscle.
<i>In.S'.</i>	Free portion of the inhalant siphonal chamber.	<i>P.R.P.</i>	Retractor pedis posterior muscle.
<i>L.</i>	Liver.	<i>P.St.</i>	Pyloric division of the stomach.
<i>M.</i>	Mouth.	<i>R.</i>	Rectum.
<i>M.C.</i>	Musculus cruciformis, a transverse muscle, situated ventrally to the siphon.	<i>S.T.</i>	Tentacles bordering the siphonal apertures.
<i>M.P.</i>	Developed portion of the muscular ridge, representing the muscular papilla of <i>Solen</i> .	<i>St.</i>	Stomach.
<i>M.L.</i>	Left mantle lobe.	<i>S.R.M.</i>	Siphonal retractor muscle.
<i>Oc.</i>	Oesophagus.	<i>T.P.M.</i>	Transverse pedal muscles.
<i>Oc.C.R.</i>	Ridge dividing the posterior oesophagael from the cardiac portion of the stomach.	<i>V.</i>	Ventricle.

EXPLANATION OF PLATE X.

- Fig. 1. *Pharella orientalis*, Dunker. View from the right side, showing the alimentary canal, &c., $\times \frac{2}{3}$.
- Fig. 2. *Pharella orientalis*, Dunker. Longitudinal section of the stomach, showing the internal structure of the left side. $\times 1\frac{1}{2}$.
- Fig. 3. *Pharella orientalis*, Dunker. Longitudinal section of the stomach, showing the internal structure of the right side. $\times 1\frac{1}{2}$.
- Fig. 4. *Tagelus rufus*, Spengler. View from the right side, showing the alimentary Canal, &c. $\times 1\frac{1}{2}$.
- Fig. 5. *Tagelus rufus*, Spengler. Longitudinal section of the stomach, showing the internal structure of the left side. $\times 2$.
- Fig. 6. *Tagelus rufus*, Spengler. Longitudinal section of the stomach, showing the internal structure of the right side. $\times 2$.

OTTO FRANZ VON MOELLENDORFF.

By DR. W. KOBELT.*

(Plate xi.)

There are men who, born collectors, are predestined to be systematists, who from earliest childhood pick up anything in nature which seems remarkable, and try and give it the right place. Such a man was Dr. Otto Franz von Moellendorff, who on the 17th of August of this year was taken away from science much too early by a malicious cancerous disease. Born on the 24th of December in 1848, at Hoyerswerda, he had a leader from the first years of his childhood in his father, who was a Commissioner of Agriculture, and later President of the Natural History Society in Görlitz. The museum of that Society was the envious boy's dearest abode, and when in 1866 he went to the University of Halle, it was quite natural that he should take up the study of Natural Science. As circumstances did not permit of his taking up a scientific career, he devoted his time to the study of Chemistry, but his heart never left Zoology, and the desire to visit foreign countries. Therefore he seized, in 1870, the chance by accepting an offer from Dr. Blau, General Consul at Serajewo, to accompany him as a teacher for his children to Bosnia.

Bosnia, which was at that time still Turkish and uninvestigated, found Moellendorff, besides his position, which was very suitable to his teaching powers, and later his wife, who was an unwearied companion in his work, a rich field for investigation.

Already at that time he was a member of the German Malacological Society, and corresponded with me, an intercourse which has continued without a break for more than thirty years. In his "Fauna of Bosnia," written in 1872, as a thesis for his degree of Doctor of Philosophy, the land and fresh water molluscs constitute the chief part. Dr. Blau, knowing the teacher's uncommon gifts, induced him to take up the Consulate's career. The only prospects at that time lay in the extreme East, especially in China, so the new doctor of Philosophy reported himself for China, and in 1873 went as Interpreter to Peking. His great talent for languages, and his capability of adapting himself to foreign circumstances and of understanding foreigners, made him advance quickly. We find him

* Translated and communicated by Herr D. F. Heynemann, from the *Nachr. Deutsch. Malak. Gesell.*, 1903, pp. 161—167.

till 1880 in Peking, Tientsin, and Shanghai; afterwards as Consul in Canton, Hong Kong, and again at Canton. But for higher positions two things stood in his way—an old family failing, a too stubborn nature, and his love for natural science, which latter seemed to competent judges inexplicable and very suspicious—so, being a master of the Chinese language and intimate with their circumstances, he was transferred to Manila.

In China he had already collected with unwearied perseverance, and made several converts to Malacology, increasing our knowledge in quite an unexpected manner. In the Philippines such results were scarcely to be expected; for, according to the general opinion, the islands had been thoroughly searched by Cuming, Semper, Jäger, and Quadras, and small species there were totally unknown. This, however, seemed to the new Consul, after his experiences in the South of China, simply impossible, in spite of the assertions of Quadras. Indeed, Moellendorff soon had the opportunity of proving he was in the right. It gave him much pleasure to tell how on the first trip with Quadras to Montalban, near Manila, and face to face with the lime rocks, he said to his companion if there be no small species here, he would confess that he was in the wrong, and throwing themselves full length on the ground at the foot of the rocks, Quadras was the first to find a small operculate, which proved to be a new species. Thereupon, the spell was broken, and quite an unthought-of abundance of minute forms rewarded the collecting. For eleven years, from 1886 to 1896, Moellendorff kept on, so far as his official duties permitted, and not only Quadras as well, but some German friends also. Moellendorff added to the molluscan fauna of the Philippines, directly or indirectly, some eight hundred species. No sacrifice seemed too great to him, in view of his aim—the exact knowledge of the Archipelago.

Alas! he could not escape the consequences of his lengthened stay in a tropical climate; anaemia and heart weakness laid hold of him, and in the autumn of 1896 no other choice was left him but to look out for a cooler climate. The German Empire had for a man who had spent twenty-three years' service in the tropics sacrificing his health, no other position than the Consulship at Kowno. No choice was left him in consideration of a large family, and so from 1896 until 1901 he had to remain in that remote forlorn place, severed from any intellectual impulse. Here also he did not rest, for he succeeded in rousing some interest for investigation of the home country, and in founding a Natural Science Club.

Then a happier fate appeared to beckon him. The new Frankfurt Academy of Commerce was to be inaugurated, and a man with experience in Consular office was sought for to undertake the lectures on Consulate business and commercial geography. As soon as attention was directed to Moellendorff, who by reason of his great experience and wide learning was particularly adapted for the position, he had only to accept the position with pleasure; and so in October, 1901, he settled at Frankfurt. The dream of his life was accomplished, an independent scientific employment

was won in a place where intellect and science reigned as in few Universities.

Moellendorff threw himself with all his might into the new circumstances, not only in the Academy but also in the Senckenbergischen Naturforschenden Gesellschaft, whose corresponding member he had been for many years; in the Verein für naturwissenschaftliche Unterhaltung, and in the Anthropological Society, established under his cooperation, he exhibited an ardent and stimulating activity. He undertook in my place the direction of the Malacological Department of the Senckenberg Museum, and commenced to re-arrange the rich collections. But only one happy year was to be granted him. Already in the autumn of 1902 the symptoms of a mysterious disease announced themselves, insignificant in the beginning, but becoming worse and worse. From the first days of 1903 he was obliged to keep to his bed. It was pitiful to see that strong man, in spite of his healthy lively mind, growing bodily weaker and weaker. On the 17th of August a quiet death released him from his sufferings, which had been endured with exemplary patience.

The masterpiece of Moellendorff's life was his conchological collection. Nine large double cabinets were filled with the treasures which he had collected, partly himself, and partly by exchanging on a large scale in the course of more than thirty years. The collection had been worked through as few have been, and contains the types of at least 1,500 species and local forms described and named by him; also innumerable specimens obtained from other authors (co-types), who had very willingly exchanged with the owner of this magnificent collection.

Success has attended the efforts to acquire this collection, as well as all the scientific materials he left behind, for the Senckenbergische Gesellschaft, and thus preserve the same for science. It will thus be possible to complete the Land Molluscan Fauna of the Philippines with the help of the list which appeared in 1901. Likewise, I also hope to supply the continuance of the Monograph on the Agnatha for the Conchylienkabinet of Martini and Chemnitz. But the plans which we made together for a Zoogeography of the Philippines on a large scale, have entirely fallen through, for only a man who has a practical knowledge of the country could execute it. Gone are many other intentions which we both thought to accomplish together. For me the hope is entirely gone, that the man eight years my junior, would one day fulfil what I myself can scarcely expect to perform.

Moellendorff was a man of firm principles, of a straightforward and honest nature, perhaps somewhat too sure of his own opinion, and not easy for everyone to get on with, but absolutely true towards his friends. His power for work was of the first order, and his knowledge was astonishingly many-sided; there were few branches of knowledge he was a stranger to, and to many men he could be a teacher. During the first decade of his stay in China he wrote several linguistic and geographical papers of importance. His map of the North of China proved of considerable service

in the campaign against Peking, and by his communications the birds and mammals of the North of China have been more accurately made known. Later he concentrated his attention more and more on the Land Shells, but even in the Philippines he continued to collect all kinds of animals which did not require a troublesome preparation, and willingly and most unselfishly placed his material at the disposal of amateurs. Even his investigations of New Guinea, and later of Indo-China, have proved of great service. His last work, during which death itself took the pen out of his hand, was the working up of the collections made by Russian investigators in the centre of China and Tibet. The examination of travellers' collections of this kind he was very fond of.

His papers appeared, for the greater part, in the "Jahrbucher" and "Nachrichtsblatt" of the German Malacological Society, as well as in the Jahresiberichten of the Senckenberg Society, some in English periodicals, as the Proceedings of the Zoological and Malacological Societies of London, the Annals of the Calcutta Museum and of the East Asiatic Society, and the Annals of the St. Petersburg Museum. Of the Molluscan Fauna of the Philippines, a supplement to Semper's Fauna, and as a part of Semper's great work, he only accomplished the Agnatha and *Naninae*; and only the two first parts, containing the *Rhytididae*, of the monograph of the Agnatha for the second edition of Martini and Chemnitz.

SOME NOTES ON THE SO-CALLED APPENDIX OF *HELICELLA BARBARA* (L.).

By H. OVERTON.

Some short time ago I communicated to the Midland Malacological Society, a paper dealing with various points in the anatomy of *Helicella barbara* (L.) = *Helix acuta*.

There are many points of interest, and they have formed the subject of various papers by different writers. Thus Schmidt, in 1854 ⁽¹⁾, described a small calcareous organ at the base of the penis; Fischer, in 1856 ⁽²⁾, described and figured the spermatophore; Ashford, in 1885 ⁽³⁾ gave a figure of the generative organs; as also Moss and Paulden, in 1892 ⁽⁴⁾, the latter authors giving a short description.

With reference to the calcareous organ described by Schmidt, I am of opinion that this is a provision to assist in holding the organs together during copulation, so as to ensure the transference of the spermatozoa. As can easily be seen in dissection, the true penis is very short.

There is no true dart-gland in this mollusc, but a small, glandular diverticulum, which has been very differently interpreted by various authors. Moquin-Tandon termed it a simple mucous gland, which, as pointed out by Ashford, can scarcely be correct. Moss and Paulden refer to this organ as a gland of doubtful function; while Mr. J. W. Taylor ⁽⁵⁾ describes it as an appendix, and regards it as probable that its affinities are with the semi-independent flagellum in *Bithynia*, *Buliminus*, etc.

While this organ cannot be regarded as a simple mucous gland, it certainly is not, in my opinion, homologous with the flagellum of *Bithynia*, etc.

The gland in question opens into the vestibule on the left-hand side, close to the opening of the short vagina. It is 4·5 millim. in length, with a maximum diameter of ·5 millim. and a minimum diameter of ·2 millim., and lies coiled upon the vestibule and vagina. Near to the distal end of this organ there is a small muscle, which attaches it to the common duct, opposite and just above the point where the vas deferens is given off (Fig. 1).

1. Geschlechtsapparat der Stylommatophoren.

2. Journ. de Conchyl., 1856.

3. Journ. Conch., 1885, vol. iv, p. 270.

4. Trans. Manchester Micros. Soc., 1892, pp. 1-5, pl.

5. Monog. L. & F. Moll., 1900, vol. i, p. 363.

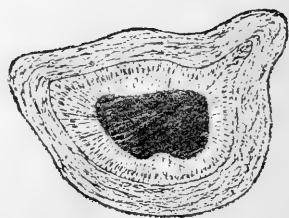
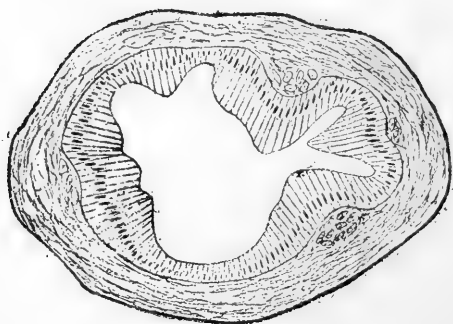
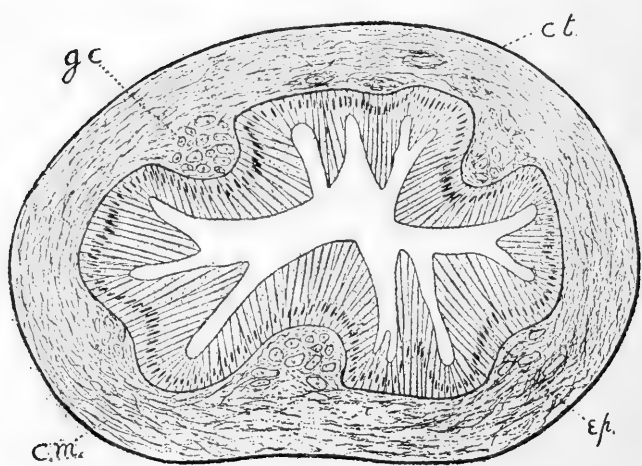
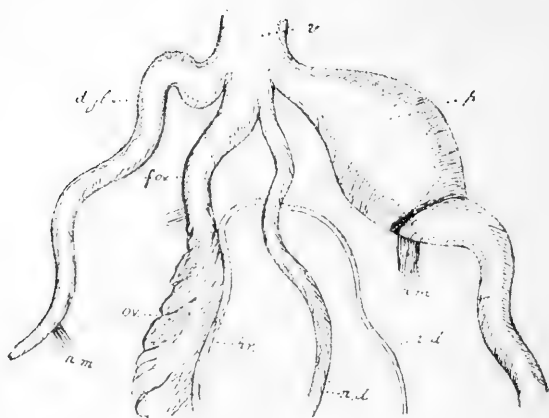
In the absence of any detailed account of the structure of this organ, Mr. Walter E. Collinge has very kindly had prepared for me a series of sections, which, I think, offer evidence of the relationship of this gland with the dart gland of other *Helices*.

In a transverse section through the proximal end (Fig. 2), the external wall is seen to be made up of a connective tissue sheath and a series of circular muscle fibres, which constitute the greater portion of the organ. Within this, at intervals, are groups of small gland cells and a lining layer of columnar epithelial cells. The lumen in this region has a somewhat stellate appearance, owing to the wall being thrown into a series of large and small longitudinal ridges. Towards the middle of the gland these ridges become less pronounced (Fig. 3); otherwise a transverse section through this region differs very little from the condition observed in Fig. 2. In a section through the distal end the gland cells appear to be absent, as also any indication of the longitudinal ridges, and the lumen contains a mass of mucous (Fig. 4).

After comparing the histological structure of this gland with that of other dart-glands, and, taking into consideration its position in relation to the other terminal ducts of the generative organs, I am inclined to regard it as a degenerate dart-gland rather than an appendix or mucous gland.

EXPLANATION OF FIGURES.

- Fig. 1 *Helicella barbara* (L.). The terminal ducts of the generative organs.
Reference Letters.—d.gl. Dart-gland. f.ov. Free-oviduct. ov. Oviduct.
p. Penis. pr. Prostrate. r.m. Retractor muscle. r.d. Receptacular duct. v. Vagina. v.d. Vas deferens.
- Fig. 2. Transverse section through the proximal end of the degenerate dart-gland.
c.m. Circular muscle fibres. c.t. Connective tissue. ep. Epithelium.
g.c. Gland cells.
- Fig. 3. Transverse section through the middle of the gland.
- Fig. 4. Transverse section through the distal end of the gland.
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A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART VIII. *)

(Conclusion.)

By G. K. GUDE, F.Z.S.

CORRECTIONS.

VOLUME IX.

Page 4, 1st col., after *Kaliella monticola*, Mdff., add = *raymondi*, Tryon.

Page 56, 8th line, 1st col., for *touaannensis*, read *tourannensis*.

18th line, 1st col., for *bacca* v. *pancala*, S. and B., read *batanica* v. *pancala*, S. and B. = *bacca* v. *sinistrorsa*, S. and B.

Page 57, 9th line, for decent read descent.

10th line, after impossible add reference to Footnote 1.

11th line, 2nd col., for *Sinicolo* read *Sinicola*.

24th and 25th line, 1st col., for v. *imperator*, Gld., *imperatrix*, West, read *imperator*, Gld., v. *imperatrix*, West.

Page 97, 10th line, for seven read nine.

Page 100, 19th line, for eight read nine.

Page 101, 36th line, 2nd col., for *supersonata* read *subpersonata*.

Page 103, 20th line, 1st col., delete comma after Arabia.

Page 104, 13th line, 1st col., after *semisculpta* for Mart. read Mouss.

23rd and 24th line, 2nd col., delete *Euparypha subdentata*. This shell has been proved to be Moroccan.

Page 112, 20th line, 2nd col., for *globula*, Kryn. v. *nana*, Boettg., read *selecta*, Klika v. *nana*, Boettg.

Page 121, 19th line, 1st col., after *pyramidata* add Drap.

Page 125, 28th line, 1st col., Owing to a printer's error *Jacosta andrewi*, Rolle, and *J. usticensis*, Calc., appear on one line. The latter is a distinct species, and not a synonym, as might be inferred.

Page 126, 32nd line, 2nd col., for *erdelli* read *erdeli*.

Page 128, 14th line, 1st col., *schotti* is out of alignment.

17th line, 1st col., for *onchynina* read *onychina*.

* See ante, p. 83.

VOLUME X.

Page 7, 38th and 39th line, 2nd col., delete Sub-genus *Angasella* and Section *Trachiopsis*.

Page 10, 33rd and 34th line, 2nd col., for Sub-genus *Angasella*, Section *Trachiopsis* read Sub-genus *Trachia*, Alb.

Page 13, 37th line, 2nd col., after *gradata*, Mdff., add *haiphongensis*, Dautz., Haiphong.

Page 15, 11th and 12th line, 1st col., for Sub-genus *Angasella*, Section *Trachiopsis* read Sub-genus *Trachia*, Alb.

39th line, 1st col., delete *Kaliella haiphongensis*, Dautz.

44th line, 2nd col., for Genus *Moellendorffia*, Anc., read Genus *Helicodonta*, Fér., Sub-genus *Moellendorffia*, Anc.

Page 58, 10th line, 1st col., *accepta* place under *Kaliella*.

Page 90, 6th line, 2nd col., for Genus *Dendrotrochus* read *Trochona-nina*, Mouss.

ADDITIONS.

Page 88, k. Alor.

Xestina rugosissima, Mdff. Is. Roma.

Chloritis romaensis, Mdff. Is. Roma.

Amphidromus laevis, Müll. v. *romaensis*, Rolle. Is. Roma.

v. *kissuensis*, Rolle Is. Kissu.

A. inconstans v. *rollei*, Gude. n.n. = v. *gracilis*, Rolle, not of Mart.; and forms *subsimplex*, *viridistriata* and *subporcellana*, Rolle. Is. Roma.

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ON A SMALL COLLECTION OF MARINE SHELLS FROM SURPRISE ISLAND.

By E. R. SYKES, B.A., F.L.S.

Recently I received, through the kindness of Mr. H. Suter, some shells which, he stated, "were collected at Surprise Island (Huon Group, N.W. of New Caledonia, 18° 31' S., 163° 8' E.), where Guano is taken and brought to Auckland." The shells are dead, and many of them are not in good condition; while, therefore, a list of the species identified is of considerable interest from the point of view of the student of molluscan distribution, it appears wiser to refrain from describing any new forms, even though names cannot be given to several of the species.

I have, therefore, given a bare catalogue, with a few notes at the close of the list.

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| <ul style="list-style-type: none"> *1. <i>Siphonaria</i> sp. 2. <i>Solidula</i> <i>sulcata</i> (Gmel.). 3. <i>Tornatina</i> <i>olivula</i>, Adams. 4. <i>Atys</i> <i>naucum</i> (L.). 5. <i>Atys</i> <i>debilis</i>, Pease. 6. <i>Haminea</i> <i>cairnsiana</i>, M. and St. *7. <i>Conus</i> sp. 8. <i>Cithara</i> <i>apicalis</i> (Montr.). 9. <i>Cithara</i> <i>reeveana</i> (Desh.). 10. <i>Cithara</i> <i>angiostroma</i>, Pease. *11. <i>Drillia</i> sp. *12. <i>Drillia</i> sp. *13. <i>Ancilla</i> sp. *14. <i>Marginella</i> <i>lifouana</i>, Crosse. (?) *15. <i>Marginella</i> <i>caledonica</i>, Jous. (?) 16. <i>Pisania</i> <i>fasciculata</i>, Reeve. 17. <i>Sistrum</i> <i>tuberculatum</i>, Blvle., var. 18. <i>Columbella</i> <i>marquesana</i>, Gask. | <ul style="list-style-type: none"> 19. <i>Columbella</i> <i>plicaria</i>, Montr. 20. <i>Columbella</i> <i>cumingi</i>, Rve., var. 21. <i>Columbella</i> <i>varians</i>, Sby. 22. <i>Columbella</i> <i>poecila</i>, Sby. 23. <i>Columbella</i> <i>discors</i>, Gmel. *24. <i>Colubraria</i> sp. 25. <i>Cypraea</i> <i>coffea</i>, Sby. 26. <i>Cypraea</i> <i>limacina</i>, Linn. 27. <i>Cypraea</i> <i>cicercula</i>, Linn. 28. <i>Terebellum</i> <i>subulatum</i>, Lam. 29. <i>Cerithium</i> <i>piperitum</i>, Sby. *30. <i>Cerithium</i> <i>novae-hiberniae</i>, Ad. (?) *31. <i>Cerithium</i> <i>zebrum</i>, Kiener. 32. <i>Cerithium</i> (?) <i>sinon</i>, Bayle (clathrata, A.Ad.). 33. <i>Planaxis</i> <i>cingulatus</i>, Ad. 34. <i>Littorina</i> <i>undulata</i>, Gray. 35. <i>Torinia</i> <i>cylindraceum</i> (Chemn.). |
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* See notes at end of list.

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| 36. <i>Torinia variegatum</i> (Gmel.). | 44. <i>Euchelus ampullus</i> , Tate. |
| 37. <i>Capulus incurvus</i> (Gmel.). | *45. <i>Stomatella sanguinea</i> , Ad. |
| 38. <i>Scala</i> sp. | 46. <i>Haliotis</i> sp. juv. |
| 39. <i>Nerita novae-guinæ</i> , Lesson. | *47. <i>Glyphisnigirradiata</i> (Rve.). |
| 40. <i>Nerita albicilla</i> (L.). | 48. <i>Psammobia pennata</i> , Desh. |
| 41. <i>Clanculus thomasi</i> , Crosse. | 49. <i>Cryptodon bullula</i> , Rve. |
| 42. <i>Clanculus stigmatarius</i> , A. Ad. | 50. <i>Tellina robusta</i> , Hanley. |
| 43. <i>Chrysostoma paradoxum</i> (Born.). (?) | 51. <i>Tellina obliquaria</i> , Desh. |
| | *52. <i>Tellina</i> sp. |

NOTES.

1. May be a young *S. siphon*, Sby.
 7. Probably the young of *C. glans*, Hwass.
 - 11, 12. Two species, in poor condition, which I am unable to identify.
 13. Probably a new species, white with a chalky zone at the suture, and smooth; recalling in form *A. sinensis*, Sby., as figured in the 'The-saurus.' It differs from *A. tricolor* in colour, and is also more elongate.
 14. Worn, with no trace of the colour markings and a trifle more slender than the typical form.
 15. More compressed at the base and with a narrower mouth; it is a marked variety, and may prove to be a species.
 24. Very close to *C. reticosa*, Ad., but may be a new species.
 30. Only one specimen, and immature, but I am unable to separate it from this species.
 31. See Vignal's careful study of this species (Journ. d. Conchyl., vol. li, p. 21); the form found appears to belong to his variety *attenuata*.
 45. Both *S. notata*, Ad., and *S. speciosa*, Ad., are mere varieties.
 47. Typical specimens of this shell, which was described without any locality being given, and is, I think, distinct from *G. rüppellii*, Sby., with which it has been united.
 52. A single small specimen, which appears to belong to a new species; allied to *T. sericata*, Melvill.
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PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

President—Walter E. Collinge, M.Sc.

Vice-President—E. R. Sykes, B.A., F.L.S.

Honorary Members—Dr. Henry Fischer, Prof. L. Plate, Prof. W. C. M'Intosh, M.D., LL.D., F.R.S., Prof. H. Simroth, Prof. H. A. Pilsbry, Sc.D., and Edgar A. Smith, I.S.O.

Treasurer—H. H. Bloomer.

Librarian and Curator—Guy Breeden.

Council—Guy Breeden, H. Willoughby Ellis, F.E.S., H. McClelland, and Bromley Peebles.

39TH (ANNUAL) MEETING, DECEMBER 12TH, 1902.

The President in the chair.

The Annual Report of the Council and the Treasurer's statement were read and adopted.

The Secretary reported that, as no amendments had been received to the Council's nominations, the above-mentioned Council and officers were elected for 1903.

EXHIBITS.

On behalf of Professor T. D. A. Cockerell, the following shells were shown and distributed amongst the members present:—*Ashmunella hyporhyssa* v. *edentata*, Ckll., from Cloud Croft, New Mexico; *A. thomsoniana* v. *porteræ*, Pils. and Ckll.; *Vallonia cyclophorella*, Ancey; *Pupa blandi*, Morse; *Pyramidula cockerelli*, Pils., all from Beulah, N.M. By Mr. Breeden. Specimens of *Amphipeplea glutinosa* from the River Bann, Ireland, and sinistrose examples of *Helix nemoralis*, from Belfast.

40TH MEETING, JANUARY 9TH, 1903.

The President in the chair.

PAPERS READ.

Some notes on the young of *Helicigona lapicida* (L.). By Walter E. Collinge.

EXHIBITS.

The President exhibited a series of examples of *Helicigona lapicida* (L.), illustrating the various stages of development from the very young to the adult; also a malformed specimen.

By Mr. Breeden: Darts of *Helix nemoralis*.

41ST MEETING, FEBRUARY 13TH, 1903.

The President in the chair.

The evening was devoted to the examination of a large series of Asiatic Land Mollusca.

42ND MEETING, MARCH 13TH, 1903.

The President in the chair.

The following nomination for membership was read :—Rev. A. Hann.

PAPERS READ.

Review of Dr. Ridewood's recent paper on the Structure of the Gills of the Lamellibranchia, by A. D. Imms ; On the Generative Organs of *Helicella barbara* (L.), by H. Overton.

EXHIBITS.

By Mr. Bloomer : *Teredo fimbriata*, Jeff., from Southport ; *T. megotara*, Han., from Guernsey, and the variety *subericola*, Jeff., from Jersey ; *T. norvegica*, Spengler, from Torbay ; *T. navalis*, L., from Yarmouth, and its variety *occlusa*, *T. pedicellata*, Quatref., from Alderney, and *Xylophaga dorsalis*, Turton, from the West of Ireland.

By Mr. Overton : *Teredo megotara*, Han., from Ilfracombe ; *T. norvegica*, Spengler, from Deal, and pieces of timber from Deal, with holes in made by the latter species. He also exhibited an example of *Helix aspersa* with the winter epiphragm *in situ*.

43RD MEETING, APRIL 17TH, 1903.

The President in the chair.

In the absence of any demand for a ballot, the Rev. A. Hann was unanimously elected a member of the Society.

EXHIBITS.

By Mr. H. McClelland : A very fine series of shells of *Achatina zebra*, Lam., and other land shells recently collected in South Africa.

By Mr. H. Overton : A series of banded forms of *Helix pomatia*, from Charing, Kent.

44TH MEETING, MAY 8TH, 1903.

The President in the chair.

PAPER READ.

Classification of the British species of the genus *Solen*, L., by H. H. Bloomer

EXHIBITS.

Mr. H. McClelland sent specimens of *Veronicella natalensis*, Rapp., and *Urocyclus flavescens*, Kfst., from Durban.

By Mr. Overton : A series of varieties of *Helix hortensis* and *nemoralis*, from Christchurch, Kent, etc.

By Mr. Breeden : *Helix nemoralis*, *H. hortensis*, *Caecilioides acicula*, *Vitrea rogersi*, *cellaria*, *nitidula*, *Zonitoides nitidus*, and *Cochlicopa lubrica* var. *pellucida*, all from Looe, Cornwall.

45TH MEETING, JUNE 12TH, 1903.

The President in the chair.

EXHIBITS.

By the kindness of Professor T. W. Bridge, Sc.D., F.R.S., the members were invited to devote the evening to an examination of a series of drawers from the "Archer Collection" in the University Museum. The following families were illustrated:—*Solenidae*, *Clavagellidae*, and *Teredinidae*.

46TH MEETING, OCTOBER 9TH, 1903.

The President in the chair.

EXHIBITS.

By the President: Specimens (in alcohol) of *Apera burnupi*, E. A. Sm., *A. gibbonsi*, W. G. Binn., and two other specimens of *Apera*, all from Zululand; three species of *Urocyclus* and three of *Veronicella*, also from Zululand.

By Mr. Overton: *Helix aspersa*, *nemoralis* and *hortensis*, *Helicigona arbutorum*, *Hygròmia rufescens*, *Vallonia pulchella*, *Pyramidula rupestris*, and *Ena obscura* and *montana*, all from Birdlip.

On behalf of Mr. H. McClelland, 43 boxes of *Patella*, *Helcion*, and *Fissurella*, from South Africa, were shown.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xvi (pt. 61), pp. 1-64, pls. 1-18. Philadelphia: Academy of Natural Sciences.

Dr. Pilsbry commences volume xvi with an account of the genus *Anoma*, Albers, enumerating twenty species and twenty-two varieties, of which the following are new: *A. adamsi*, *A. jarvisi*, *A. nitens* (Chitty), v. *simpsoni*, *A. levis* (C.B.Ad.), v. *balteata*, and *A. nigrescens* (C.B.Ad.), v. *leucostoma*. There is a useful "Key to Species," and many of the forms are figured for the first time.

Passing next to the genus *Brachypodella*, Beck (Type *B. antiperversa*), a short account is given of the anatomy. The generative organs are similar to typical *Urocoptis*. In *B. chemnitziana* and *agnesiana* the penis is moderately developed, with the vas deferens and retractor muscle apical. The vagina is at least as long as the penis. The receptaculum seminis is sub-globular, and its duct long and slender. In the viviparous *B. chemnitziana* the uterus (the oviducal portion of the common duct) is capacious. The pharynx and salivary glands are similar to those in *Urocoptis*, but the radular sheath is enormously lengthened, stretching far into the visceral cavity. The free retractor muscles are also not unlike those in *Urocoptis*, only they are united further at the proximal end.

There is no character of the shell common to all the forms of *Brachypodella*, which will serve to separate the genus from all forms of *Urocoptis*.

A key, founded upon shell-characters, to the various sub-genera of the genus is given, and a new sub-genus *Brevipedella* (type *B. imitatrix*, n.sp.), is described, then follow the following sub-genera: *Amphicosimia*, Pils. and Van., *Strophina*, Mörch, with *B. latteradii* (Grat.), v. *strophina*, nov., *Liparotes*, Pils., *Siphonolaemus*, Pils., and *Gyraxis*, Pils., with *B. gouldiana* (Pfr.), v. *sericata*, nov.

Kunkel, Karl.—Zuchtversuche mit linksgewundenen Weinbergschnecken (*Helix pomatia*). Zool. Anz., 1903, Bd. xxvi, pp. 656-664.

As a result of a series of experiments upon the propagation of sinistral *Helix pomatia*, the author finds that after waking up from their winter sleep they absorb a large quantity of water, equal to about an increase of 40-48 %. Under favourable conditions they then proceed to copulate, and again after the eggs have been laid. The young snails copulate in their first year. Darts are not absolutely necessary for copulation. As a rule *H. pomatia* copulates during, or after, warm rain and under favourable conditions eggs are laid twice in the same summer, on the other hand many do not lay eggs in the same summer. The laying of eggs takes place from the middle of June to the middle of August, and almost always after the warm rain. Given moderate moisture and warmth nearly all the eggs develop after about 25 or 26 days, and for 8-10 days remain in the earth, leaving it when rain falls. If the eggs develop under pressure, flat forms arise, but no sinistral ones, and normal growth ensues when the pressure ceases. Sinistral specimens produce dextral ones. Given warmth, moisture and food, the snails are active until the end of November.

Nierstrasz, H. F.—Neue Solenogastren. Zool. Jahrb. (Abth. f. Morph.), 1903, Bd. 18, pp. 359-386, T. 35, 36.

Dr. Nierstrasz describes three new species of *Chaetoderma*, viz., *challengeri*, *normanni*, and *canadense*, also *Uncimania neapolitana*, gen. et sp. nov.

Murdoch, R.—On the Anatomy of *Paryphanta busbyi*, Gray. Trans. N.Z. Inst., 1902, vol. xxxv, pp. 258-262, pl. xxvii.

An account of the anatomy of *Paryphanta busbyi*, Gray, has long been looked forward to, and Mr. Murdoch is to be congratulated on having at last obtained an example of the interesting mollusc.

The alimentary canal, so far as it is described and figured, does not appear to differ much from that of *P. hochstetteri*, Pfr., and the same may be said of the kidney, lung, and pedal gland. The buccal mass and pedal retractors are fused together posteriorly, where they unite with the columella of the shell. The buccal retractor is a broad, powerful, band, lying on the dorsal side of the pedal muscles, branching from the latter are the ocular retractors, which bifurcate towards the anterior ends. The pedal retractors are continuously attached to the foot.

The generative organs differ from the condition which obtains in *P. hochstetteri*, Pfr., *P. edwardi*, Suter, and *P. urnula*, Pfr., in the extreme reduction of the male organs, and the absence of a receptaculum seminis, and exhibit a remarkable resemblance to the generative organs of *Schizoglossa novoseelandica*, Pfr.

Melville, J. Cosmo and Standen, R.—Descriptions of Sixty-eight new Gastropoda, from the Persian Gulf, Gulf of Oman, and North Arabian Sea, dredged by Mr. F. W. Townsend, of the Indo-European Telegraph Service, 1901-1903. Ann. and Mag. N. H. (s. 7), vol. xii, pp. 289-324, pls. xx-xxiii.

Two years ago the authors published the first part of a Catalogue of the Mollusca of the Persian Gulf, etc., enumerating 935 species, of which 77 were new; to this they now add 68 new Gastropoda.

Most of the specimens are of small size, though a few—e.g., *Murex marjoriae*, *Trichotropis pulcherrima*, and the superb *Pleurotoma navarchus*—are more conspicuous. Special mention may be made of the two new species of *Homalaxis*, a *Fluxina*, the first recorded from the Old World, a curious *Rissoina* (*registomoides*), a new species of *Metula* and many *Pleurotomidae*, while the occurrence of *Kleinnella sympiestra*, adds a new genus to this region.

Sykes, E. R.—The Zoological Record, 1902, vol. xxxix. Division vii. Mollusca. pp. 85. London, 1903.

Mr. Sykes, assisted by Mr. E. A. Smith, again presents us with another year's valuable record, and we should like to direct the attention of all Malacologists to the fact that the Division treating of the Mollusca may now be obtained separately, and at a trifling cost.

Kunkel, Karl.—Zur Locomotion unserer Nachtschnecken. Zool. Anz., 1903, Bd. xxvi., pp. 560-566.

The author's observations on the locomotion of slugs corroborate Simroth's view, that the species of *Arion* are slower and more sluggish than the species of *Limax*. His experiments lead him to the following conclusions: *a.* In decapitated slugs the wave-play does not only remain in the foot, but also in the excised pieces. The explanation of this phenomenon is due, as pointed out by Simroth, to the fact that, "the ganglia in the meshwork of the pedal musculature are sympathetic, and the wave-play is automatic. *b.* If the wave-play has ceased in individual pieces, it is possible to set these going again by mechanical and light stimuli. The stimulus probably being conducted through certain nerve fibres connecting the ganglia in the pedal nerve-network with the integumentary nerve cells. *c.* In the individual pieces of *Arion* mechanical stimuli produced energetic contraction, while light stimuli produced the wave-play. *d.* The pieces of *Limax* exhibited a stronger wave-play. *e.* If the slugs are divided into three or more parts, the middle piece exhibits less power of movement than the head and tail-pieces. *f.* Pieces of the head and tail of *Limax* divided into smaller pieces move more quickly than uninjured animals. *g.* The young *Limaces* move more quickly than the adults.

Sykes, E. R.—Notes on some British *Eulimidae*. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 348-353, pl. xiv.

All who have at any time attempted the identification of the smaller forms of British *Eulima*, know how very difficult it is to arrive at a satisfactory decision; such will welcome Mr. Sykes' timely notes and figures.

A new species is described and figured, *E. collinsi*, from Guernsey. This is the *E. incurva* var. *monterosatoi* of Mr. J. T. Marshall. *E. platyacme*, n. nom.; for *E. solida*, Jeffreys, should also be noted.

Sykes, E. R.—On the Land Operculate Mollusca collected during the "Skeat Expedition" to the Malay Peninsula in 1899-1900. Proc. Zool. Soc. Lond., 1903, pp. 194-199, pl. xx.

The author records 23 species, of which 8, and 1 variety, are new, viz., *Lagochilus kobelti*, *Ditropis cavernae*, *Pterocyclos subalatus*, *Rhiostoma jalorensis*, *Rhaphanus ascendens*, *R. perakensis*, Smith, var. *jalorensis*, *Opisthostoma annandalei*, *Diplommata skeati*, and *D. laidlawi*.

Baker, F. C.—Rib Variation in *Cardium*. Amer. Nat., 1903, vol. xxxvii, 481-488, figs. 1-7.

Mr. Baker has studied the rib variation of *Cardium rodustum*, *isocardia* and *muricatum*, and finds that *robustum* is the least variable and *muricatum* the most, *C. isocardia* standing midway between these two species. He is of opinion that the number of ribs is not a safe character upon which to found species.

Woodward, B. B.—List of British Non-Marine Mollusca: Journ. Conch., 1903, vol. 10, pp. 352-367.

Mr. Woodward is to be congratulated upon the publication of, and malacologists in at last possessing, a List free from personal bias, and one which is stamped with a genuine attempt to deal in a scientific manner with the many difficulties surrounding such a task.

Whether one agrees or disagrees with the author in all points, but few will be found who will not welcome a List free from the burden of varieties, sub-varieties, mutations, monstrosities, etc., and one in which the nomenclature is at least in keeping with that adopted by malacologists throughout the world.

The List is accompanied by eleven pages of explanatory notes, and should be in the hands of every malacologist who takes an intelligent interest in the British Non-marine Mollusca.

Davis, J. R. A. and Fleure, H. J.—*Patella* (The Common Limpet.) L.M.B.C. Memoirs, 1903, vol. x, 76 pp., 4 pls.

The authors are to be congratulated on the completion of this interesting memoir, which brings together in a very concise manner the leading structural features of *Patella vulgata*. So much has been written upon the anatomy of this species, that it was scarcely to be expected that any important discoveries would be made, still the authors believe the following points to be new: (1) A lateral glandular streak has been found along each side of the foot of young specimens; resembling that found in *Nacella* and its allies. (2) A muscular zone, to which the term internal pallial zone is applied, has been found extending in the mantle between the tips of the shell muscle. (3) The structure of the Crop, and inferences consolidation of the visceral hump. (4) The respiratory function of the nuchal cavity as regards damp air. (5) Discussion of the evolution of the present topographical relations of rectum, kidneys, pericardium and heart. (6) Details of mantle innervation and pallial tentacles.

The reproduction of the figures is poor, they would prove much more useful if in the text and if, in some cases, they were larger. An almost entire absence of references to the literature, seriously detracts from the value of the work, besides being scarcely fair to previous workers.

Dall, W. H.—Synopsis of the family *Astartidae*, with a review of the American species. Proc. U.S. Nat. Mus., 1903, vol. xxvi, pp. 933-951, pls. lxii-lxiii.

The *Astartidae* are an ancient group of molluscs, from which the *Crassatellitidae* have diverged in the later Mesozoic and taken definite form in the Eocene. The two families are chiefly discriminated by the character of the ligament, which in the former family is external as well as the resilium, while in the *Crassatellitidae* it is separated from the resilium, which, excepting in *Eriphyla*, is deeply immersed. It would seem that each family has an exceptional and peripheral group. Thus in *Eriphyla* the process of immersion of the resilium has only begun, but the remaining characters of the shell are so close to *Crassinella*, that the two must obviously be associated in the same family. On the other hand, in *Lirodiscus* of the *Astartidae*, the resilium is separated from the ligament, but still remains external, while the other characters link it to *Astarte* similarly to those which bind *Eriphyla* to *Crassinella*.

Lists of the species of the Eastern and Western coasts are given and reviewed, and six new species described.

Sturany, R.—Gastropoden des Rothen Meeres. Denk. Akad. Wien, 1903. Bd. lxxiii, pp. 209–283. Tfn. i–vii.

In a valuable and interesting paper Dr. Sturany records 294 species, of which the following are new: *Fusus bifrons*, *Nassa thaumasia*, *steindachneri*, *xesta*, *munda*, *sporadica*, *stiphra*, *lathraia*, *Mitra gonatophora*, *Columbella erythraeensis*, *nomanensis*, *Conus aculeiformis*, Rve. form *torensis*, *C. planiliratus*, Sby. var. *batheon*, *Pleurotoma potti*, *inchoata*, *siebenrocki*, *nannodes*, *beblammena*, *Mangilia pertabulata*, *epicharis*, *Solariella illustris*, *Emarginula harmilensis*, *Atys lithensis*, *Clathurella dichroma*, *Capulus camaranensis*, *Eulima muelleriae*, *orthophyes*, *Stylifer thielei*, *Syrnola trivittata*, *Elusa halaibensis*, *Triforis senafirensis*, and *Euchelus erythraensis*. All the new species, etc., are beautifully figured, in addition to many of the other species.

Mollendorff, O. von.—Neue Landschnecken von Niederländisch Indien. Nachr. Deutsch. Malak. Gesell. 1903, p. 156.

Chloritis romaensis and *Xestina rugosissima*, nn. spp.

Sykes, E. R.—Description of *Cerastus dinshawi*, n. sp. from Aden, with a note on *Otopoma clausum*, Sby., and *O. yemenicum*. Brgt. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 338, 339, 2 figs.

Cockerell, T. D. A.—Variation in the Snail-genus *Ashmunella*. Proc. Ac. Nat. Sci. Philad., 1903, pp. 615, 616.

Andrussoff, N.—Studien über die Brackwassercardiden. Mém. l'Acad. Imp. Sci. St. Pétersb., 1903 (s. viii), T. viii, T. xiii, pp. 1–82, T. i–vii.

Perrier, E. et Gravier, Ch.—Sur les causes physiologiques qui ont déterminé la constitution du type Mollusque. Compt. Rendus. 1903, T. cxxxvi, pp. 727–731.

Smith, Edgar A.—On *Xylophaga praestans*, n. sp., from the English coast. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 328–330, figs. i–iv.

Smith, Edgar A.—Note on *Macron trochlea*. Journ. Conch., 1903, vol. 10, p. 351.

Smith, Edgar A.—A new species of *Modiola* from Malacca. Journ. Conch., 1903, vol. 10, p. 368.

Smith, Edgar A.—A List of Species of Mollusca from South Africa, forming an Appendix to G. B. Sowerby's "Marine Shells of South Africa." Proc. Malac. Soc. Lond., 1903, vol. v, pp. 354–402, pl. xv.

GENERAL REVIEWS.

A Treatise on Zoology. Edited by E. Ray Lankester: Pt. i, second fascicle. Introduction and Protozoa. By J. B. Farmer, J. J. Lister, E. A. Minchin, and S. J. Hickson. 8vo, pp. vi + 451. London, 1903. Adam and Charles Black.

We welcome a further volume of this valuable work, which forms the second fascicle of Part i., and treats of the Structure of Animal and Vegetable Cells, the Foraminifera, Sporozoa, and Infusoria.

In the small space of 46 pp. Dr. Farmer gives an admirable account of the structure of animal and vegetable cells, incorporating many of the latest investigations in cell mitosis. All the articles which have so far appeared have had

a useful bibliographical appendix, and the absence of such to this section is much to be regretted.

Dr. Lister's lucid article on the Foraminifera, will be welcomed as a succinct and clear account of this interesting class.

The most complete, and by far the most important, section is Professor Minchin's most timely and valuable treatise on the Sporozoa, which is far and away the finest text-book on the subject. Finally, Professor Hickson gives an admirable account of the Infusoria.

As in the previous volumes, the illustrations, many of which are original, are remarkably good, and the general method of treatment leaves nothing to be desired.

A Manual of Zoology. By Richard Hertwig, translated and edited by J. S. Kingsley. 8vo, pp. xi + 704. London, 1903. George Bell and Sons.

This is a translation of the fifth German edition of Professor Hertwig's well-known "*Lehrbuch der Zoologie*," edited and modified by Professor Kingsley.

The work is intended for beginners, and no more admirable summary of the history and general principles of zoology could be put in the student's hands than that contained in the first 181 pages. If for no other reason, this alone places the work as one of the best of its kind, and very much superior to the majority. This section is characterised by a clearness and breadth hitherto unknown in any English text-book, and will undoubtedly prove of great value to the class of students for whom the work is written.

The remaining portion reviews the whole of the animal kingdom, and is remarkably well illustrated.

EDITOR'S NOTES.

On completing the tenth volume, the Editor tenders his grateful thanks to all who have in any way furthered the interests of the Journal during 1903.

The Journal has no permanent endowment; and, excepting one year, there has been an annual deficit on each volume. During the past year a number of subscribers have been struck off the list, all reasonable efforts having failed to obtain their subscriptions to volumes viii, ix, and x. This, of course, has largely increased the deficit on volume x.

We have again to appeal to those subscribers whose subscriptions are in arrear to kindly forward the same.

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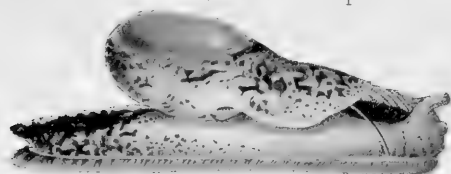
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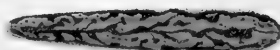
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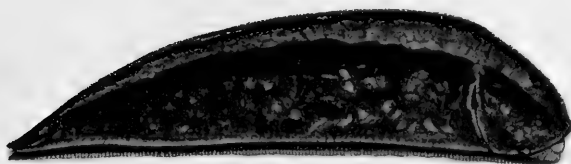
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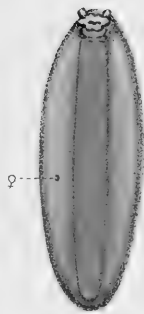
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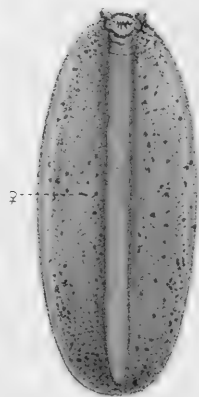
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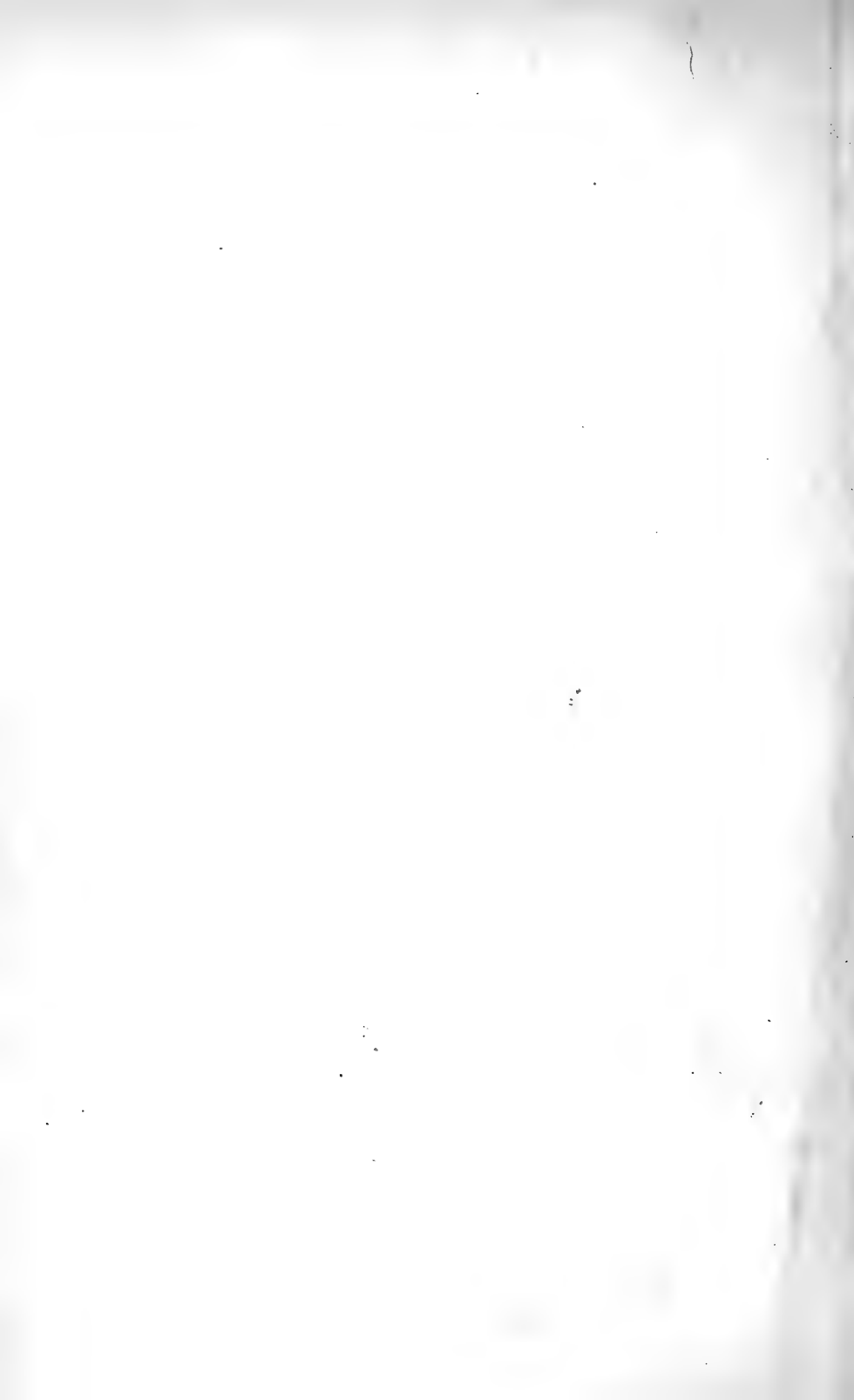


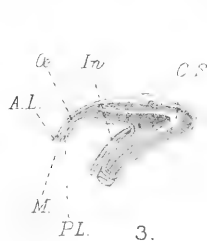
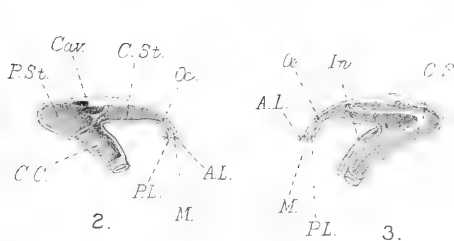
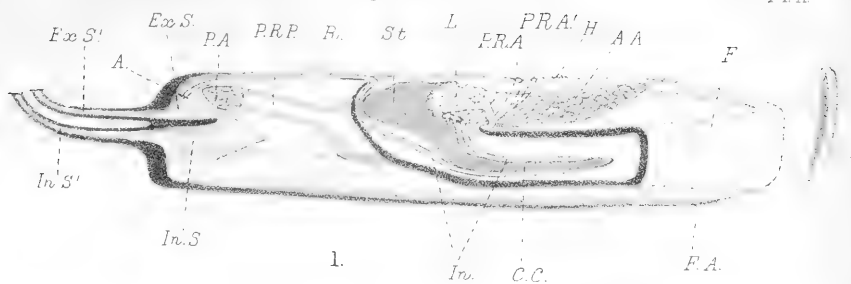
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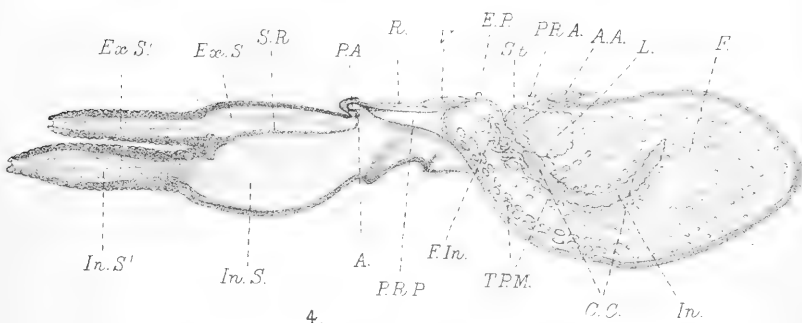
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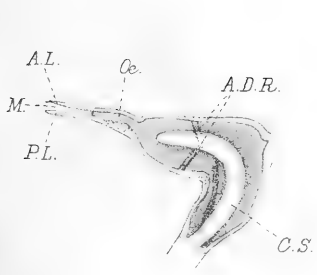




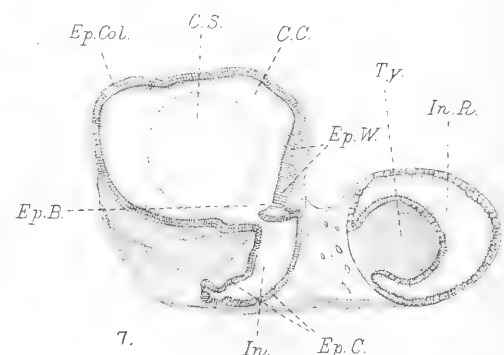
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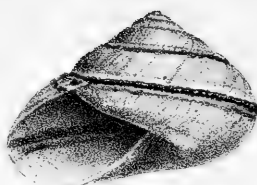
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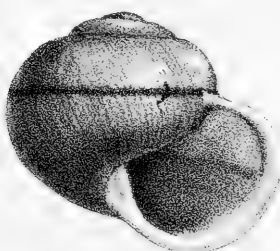
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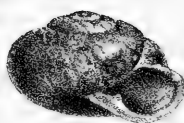
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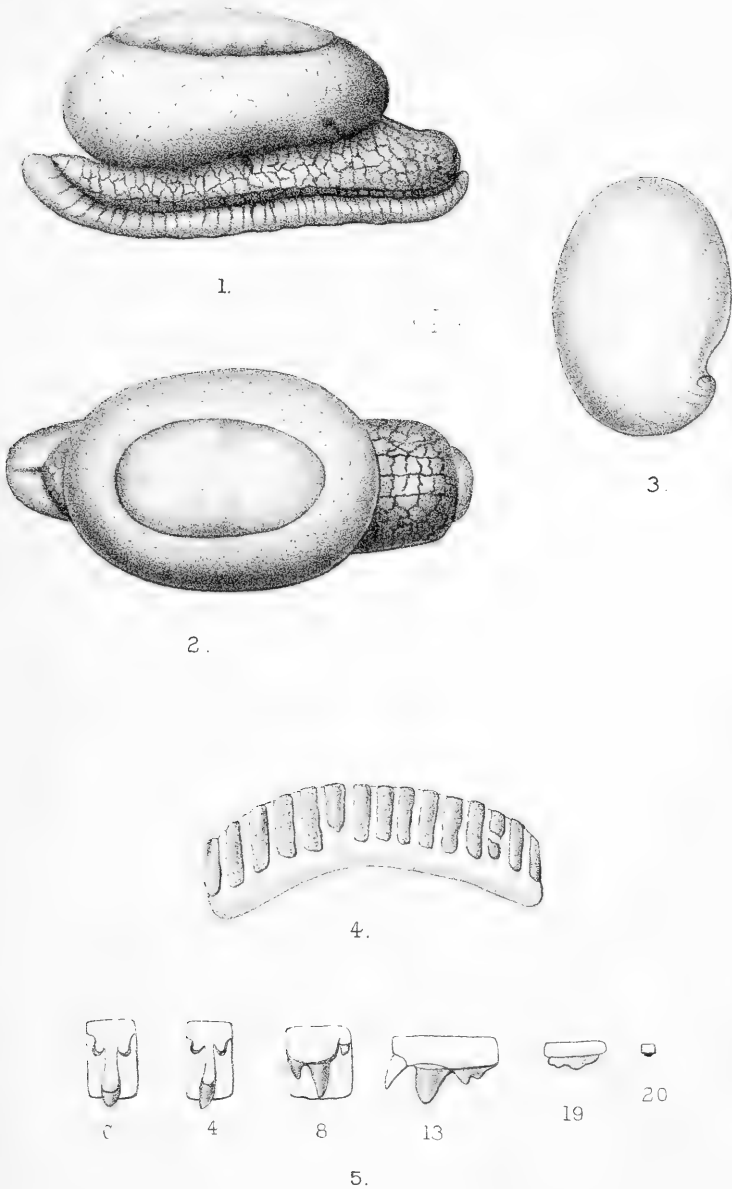


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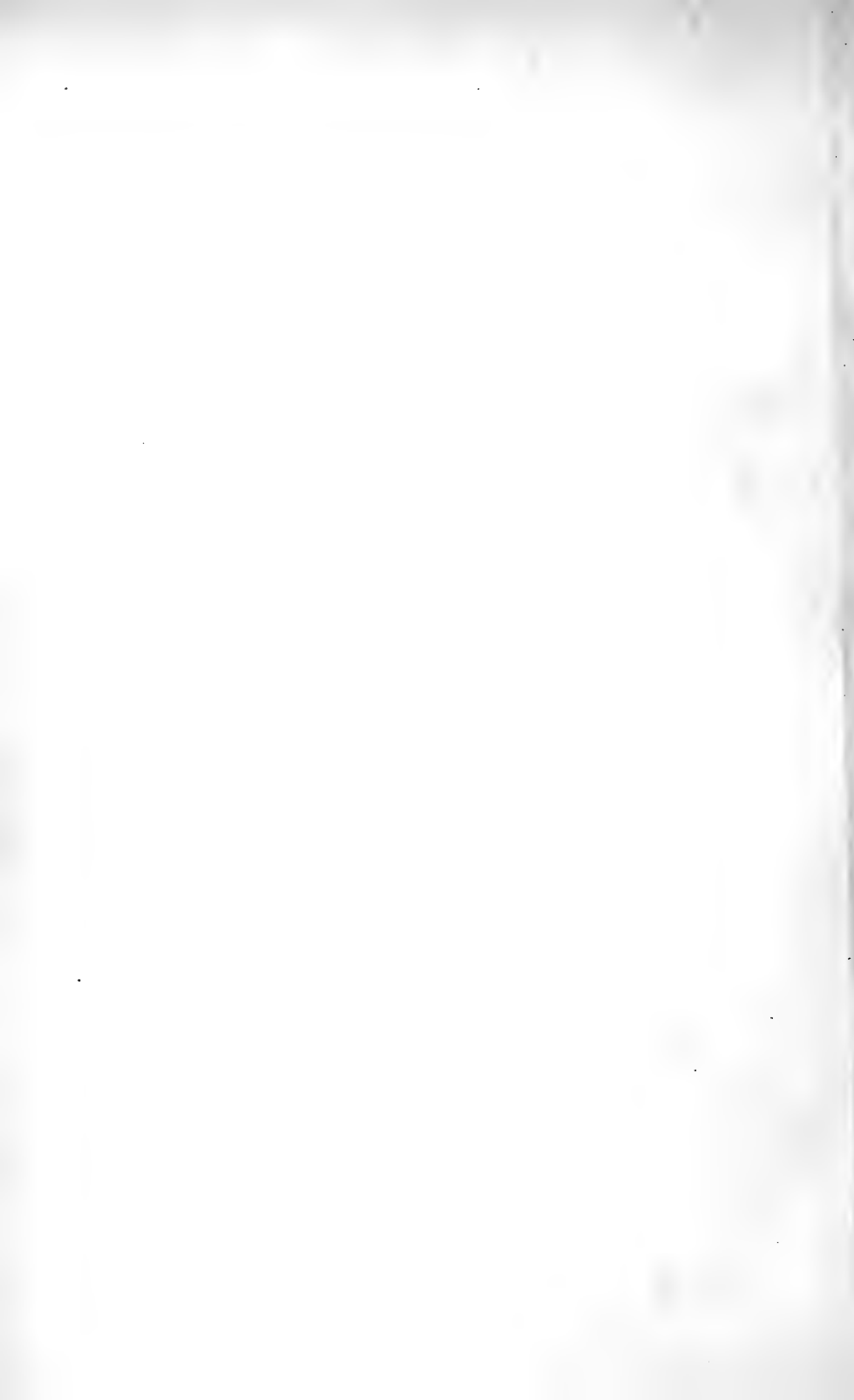
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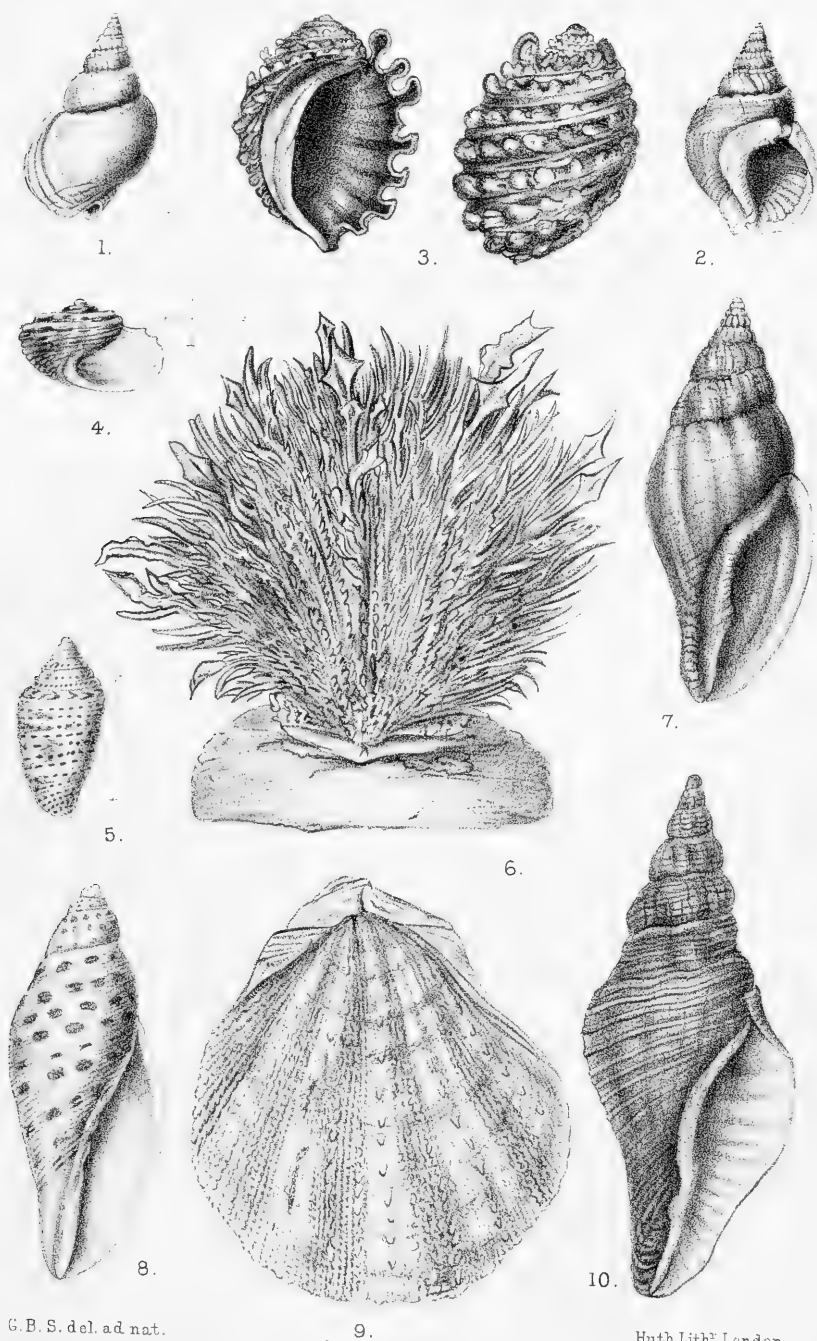
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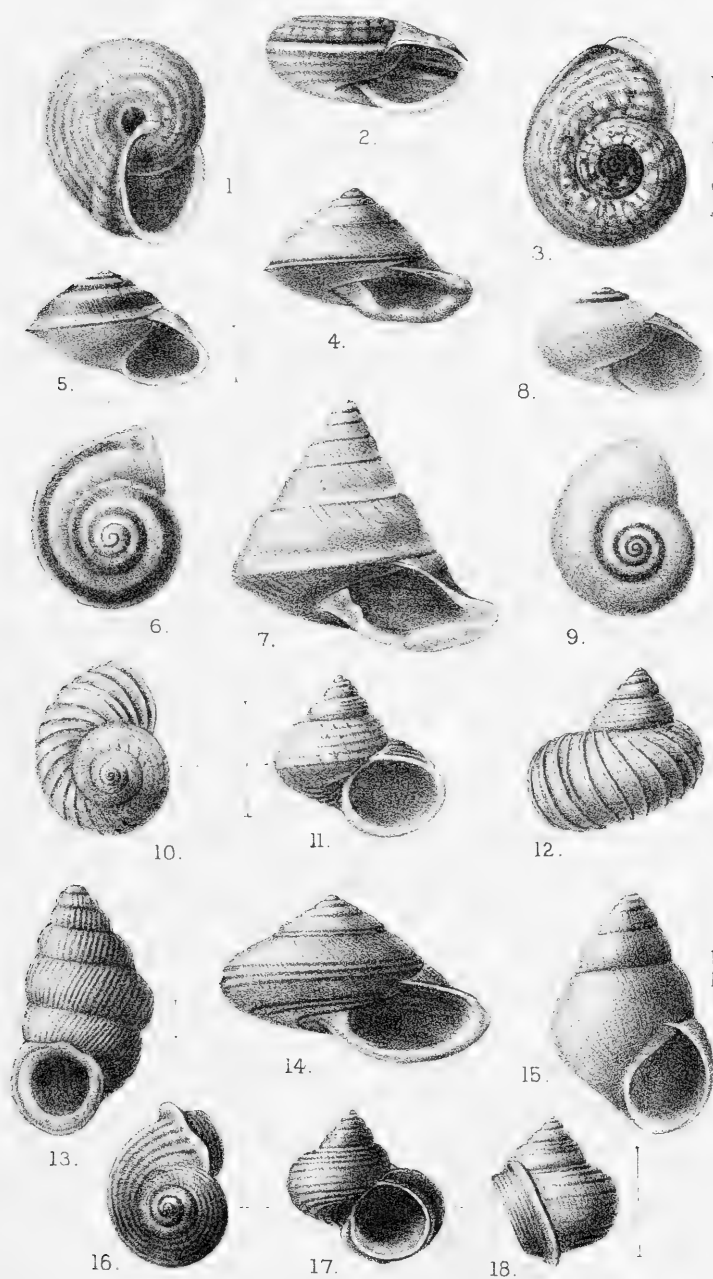




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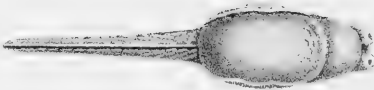


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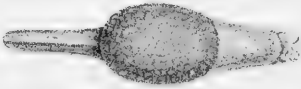
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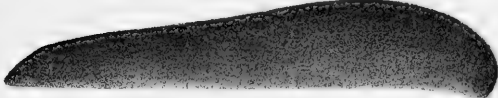
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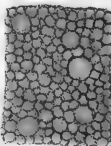
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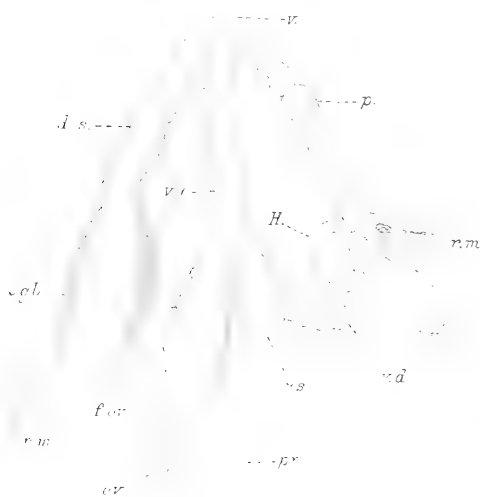
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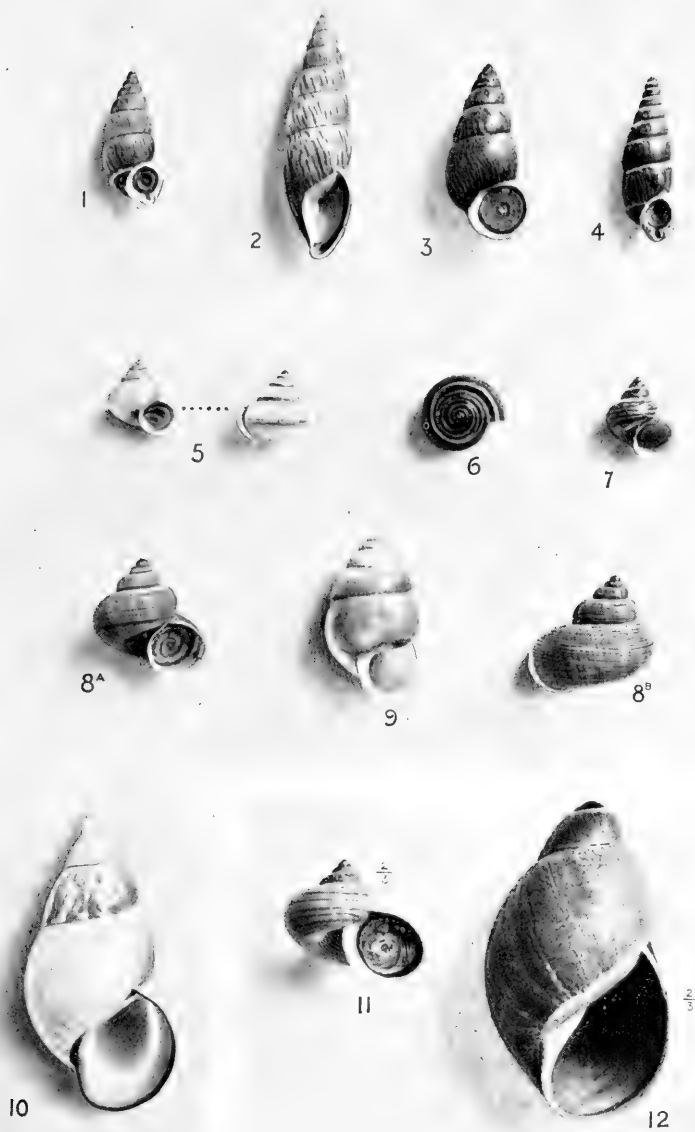
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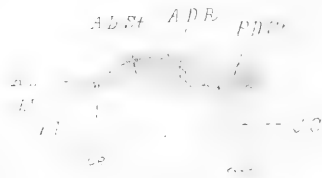
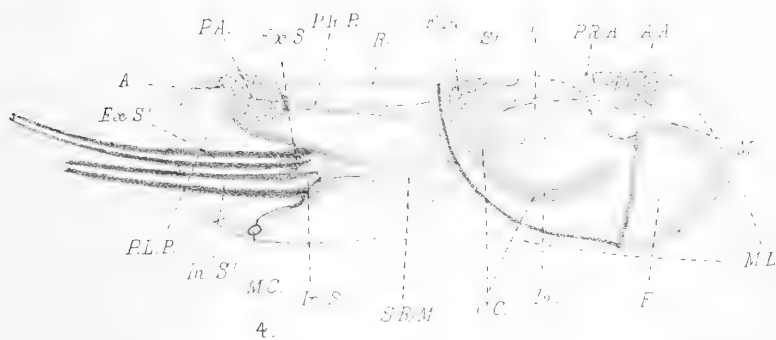
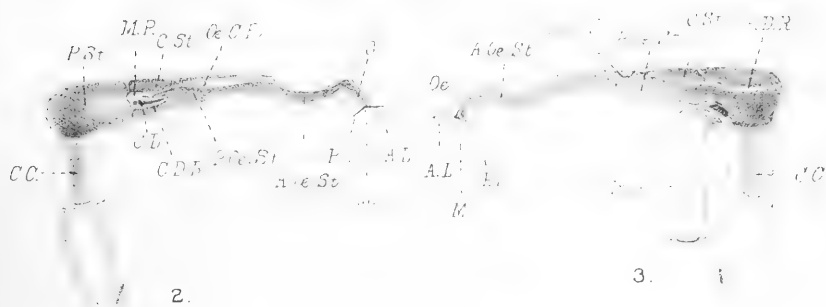
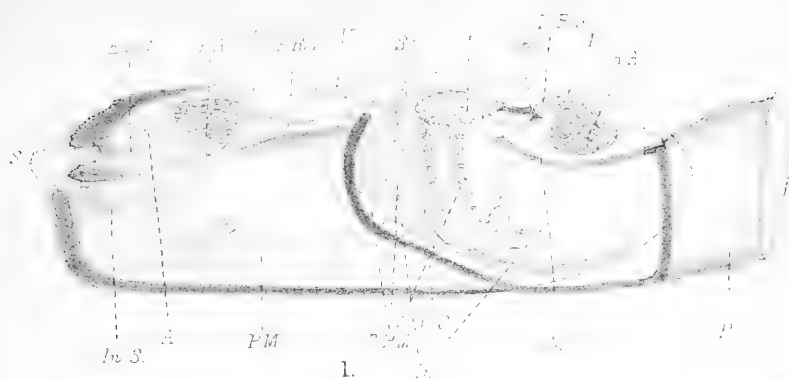


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W. E. C. del. et nat.

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H.H.B. del. ad nat.

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ANATOMY OF PHARELLA & TAGELUS.





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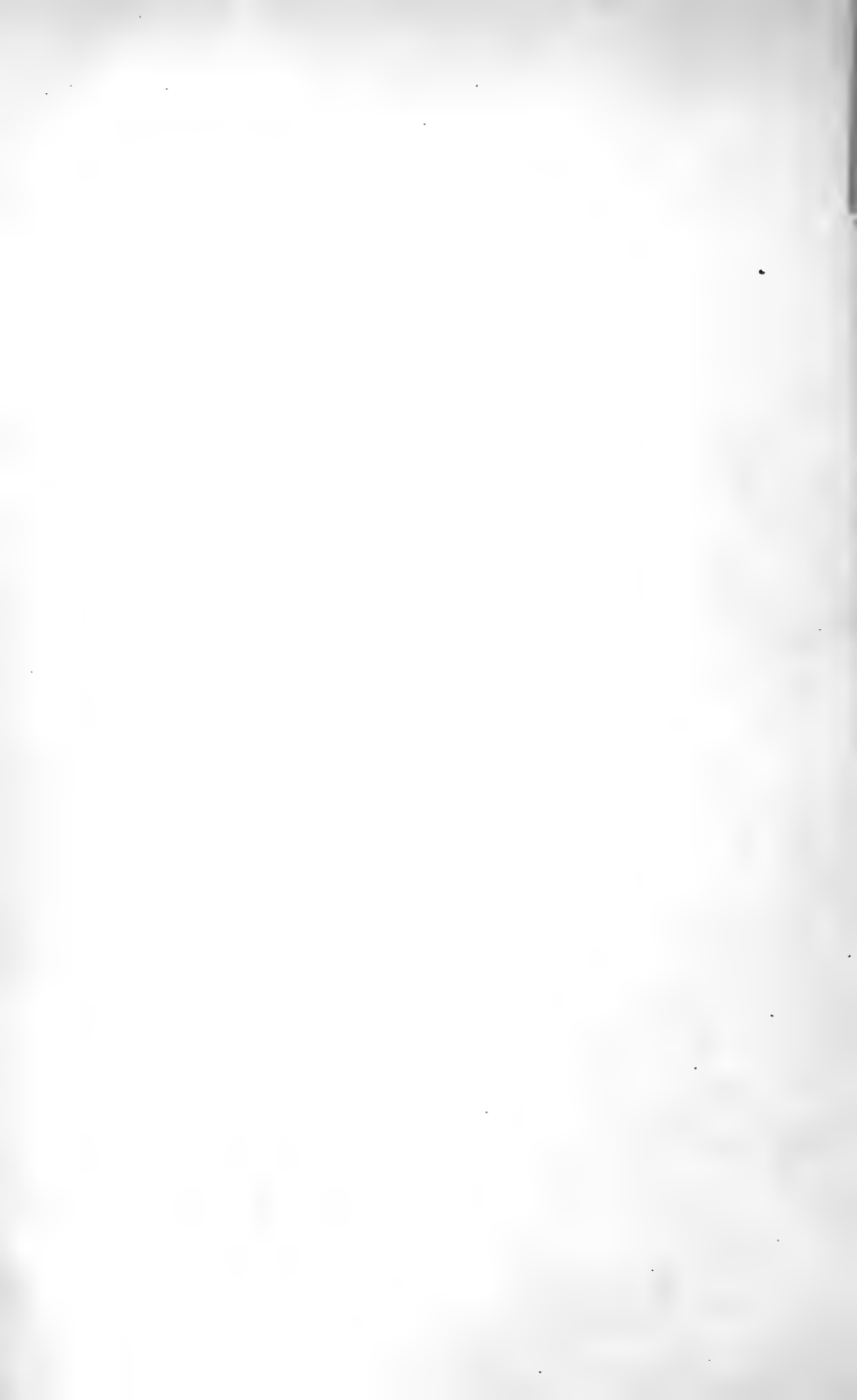
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NOTES ON THERSITES (HADRA) BELLENDENKERENSIS,
BRAZ., AND BEDDOMAE, BRAZ.

BY HUGH FULTON.

Having examined an authentic specimen of *beddomae*, Braz., from the collection of the late Capt. C. E. Beddome, I have no hesitation in placing it as a variety of *bellenkerensis*, Braz., a species that is most variable in size and form. The variety *beddomae* is thinner, generally more depressed, and the minute ziczac sculpture is more distinct, being just discernable (on fresh specimens) without a lens.

The specimen mentioned above is of similar dimensions to the type, but two other specimens before me, one of which was collected together with *bellenkerensis* in Queensland by Emil Weiske, the other being in Dr. Cox's collection and labelled *bellenkerensis*, are more depressed, viz. :

maj. diam. : 41 ; alt. 30. (Coll. Weiske).

„ „ 38 ; „ 28. (Coll. Dr. Cox)

The original figure of *bellenkerensis* in the Proc. Zool. Soc., 1875, t. 4, f. 4 and copied in Tryon's Manual, vol. vi, pl. 34, fig 1 does not agree with the dimensions given in the description, viz. : Alt. 17, greater diameter 22, lines (= Alt. 36, maj. diam. 45 millim.) whereas the figure measures, alt. 45, maj. diam. 44 millim.

Judging from specimens I have examined the figure is out of proportion, being much too high in proportion to its diameter.

A CRITICAL LIST OF THE SPHOEROSPIRA SECTION OF THERSITES.

By HUGH FULTON.

(Plate i.)

The collections of Dr. James C. Cox of Sydney, and of the late Capt. C. E. Beddome, both rich in specimens of this group, having passed through my hands, I have had the opportunity of examining many typical specimens, and thought a critical list might be of some service.

One great difficulty in working out this group has hitherto been the lack of authentic material, so many of the species having been founded upon such slight characters, that without one had for comparison actual types or co-types, it was quite impossible to identify specimens with any certainty from descriptions. Fortunately, the collections mentioned above contained many co-types, especially of the forms described by John Brazier of Sydney, whose descriptions, often without figures, and very rarely with comparative notes, generally indicate but characters common to the whole group.

It is probably owing to lack of authentic material at his disposal, that Dr. H. A. Pilsbry's comparatively recent monograph in Tryon's Manual is not up to his usual excellent form; his division of the section into perforate and imperforate species is not a natural one, for example, *andersoni*, Cox, occurs both perforate and imperforate, and the same thing occurs in other species of the group.

In this list I have endeavoured to arrange the various forms according to their relationship and have added notes upon their distinguishing characters.

I am greatly indebted for valuable assistance to Col. Beddome, Dr. James C. Cox, Chas. Hedley, Esq., John Ponsonby, Esq., and Edgar A. Smith, Esq.

GROUP OF *incei*, Pfr.

1.—*T. incei*, Pfr.

- P.Z.S., 1845, p. 126; Cox's Monog. Aust. L. Sh., pl. 5, fig. 5.
- = *challisi*, Cox: P.Z.S., 1873, p. 565, pl. 48, fig. 3.
- = *appendiculata*, Pfr.: P.Z.S., 1854, p. 149; Cox: Monog. Aust. L. Sh., pl. 5, fig. 11.
- = *thatcheri*, Cox: P.Z.S., 1870, p. 170, pl. 16, fig. 2.
- = *hami*, Braz.: Proc. Linn. Soc. N.S.W. (i), 1876, p. 97.
- = *hilli*, Braz.: P.Z.S., 1875, p. 32, pl. 4, fig. 3.
- = *johnstonei*, Braz.: P.Z.S., 1875, p. 32, pl. 4, fig. 2.
- = *bayensis*, Braz.: P.L.S., N.S.W. (i), 1872, p. 2.
- = *praetermissi*, Cox: Monog. Aust. L. Sh., p. 111, pl. 20, fig. 13.
- Loc.*—Queensland.

Types of *incei* and *appendiculata* in British Museum.

Compared with the type of *incei*, typical *appendiculata* is a little flatter in form, *thatcheri* a little broader, *hilli* smaller and more conical; *johnstonei* same form as *hilli*, but larger; *bayensis* is simply a thicker form of *appendiculata*, *praetermissi* is the lighter coloured variety with no circum-umbilical brown patch, but that character is not constant.

I have not seen a specimen of *challisi*, but judging from the description and figure, it is evidently almost identical with typical *incei*.

The foregoing comparisons are made from typical specimens, but they are closely linked together by intermediate forms, proving that they belong to one species.

Pilsbry, in Tryon's Manual of the Mollusca, vol. vi, p. 167, had evidently not a typical specimen of *incei* before him, but rather one of the varieties, as he distinguishes it by the absence of the brown circum-umbilical patch, a character that is present in the type specimen of *incei*.

T. *incei* v. *yepponensis*, C. E. Beddome.

Proc. Linn. Soc. N.S.W., 1897, vol. xxii, p. 123. figd.

Loc.—Yeppon, near Rockhampton, Queensland.

A lighter-coloured shell, and with the umbilicus more excavately open than in typical *incei*.

2—T. *lessoni*, Pfr.

Pfr. Sym., 1846, iii, p. 71; Reeve: Con. Icon., fig. 754.

= *seminigra*, Morelet: Journ. de Conchyl., 1864, p. 289.

= *parsoni*, Cox: P.Z.S., 1872, p. 18, pl. 4, fig. 2.

Loc.—Queensland.

Types in British Museum.

The types of *lessoni* and *parsoni* represent the extremes of this species, the former being very small and somewhat depressed, whereas the latter is larger and rather higher in the spire than usual. Although *lessoni*, by reason of its dark brown colour, white peristome, and absence of spiral bands on the lower whorls, is readily separable from *incei*; yet it agrees so closely in other respects, that I am doubtful as to whether it can be anything more than a colour variety of that species. The earlier whorls are lighter in colour and the middle ones have generally two or three narrow spiral bands.

T. *lessoni* v. *aureedensis*, Brazier.

P.Z.S., 1871, p. 640; Tryon's Man. of Conch., vol. viii, p. 282, pl. 54, figs 7-9.

Loc.—Yeppon, near Rockhampton, Queensland.

Type in Australian Museum.

Very similar above to *lessoni* in form and coloration, but slightly flatter below and with a broad light-yellowish circum-umbilical patch; the triangular dilated portion of the peristome at the point of insertion is white, whereas in *lessoni* it is of a brownish colour.

T. lessoni v. **lutea**, n. var.

Pl. 1, fig. 4.

Loc.—N. Queensland.

Same form as *lessoni* v. *aureedensis*, but of a light-yellowish colour. Of three specimens before me one is entirely bandless, but the other two have the narrow light-brown spiral bands on earlier whorls, the same as one finds on most specimens of *aureedensis*.

3.—T. curtisiana, Pir.

P.Z.S., 1863, p. 528.

= *bala*, Braz.: Proc. Linn. Soc. N.S.W. (iii), 1878, p. 78, pl. 8, fig. 4.*Loc.*—Townsville and Magnetic Is., Queensland.

Somewhat like *lessoni* in form and coloration, but the whorls increase rather more rapidly in size, it has half a whorl less, the aperture is not quite so broad, the peristome is less dilated at the point of insertion and of a light reddish-brown colour, not white as in *lessoni*.

4.—T. andersoni, Cox.

P.Z.S., 1871, p. 644, pl. 52, fig. 4.

Loc.—Rockhampton, Queensland.

Type in British Museum.

This species is most variable in size; of the twenty before me the following are the dimensions of four specimens:—

Alt. 15, maj. diam. 27 millim.

Alt. 18, „ „ 26 „

Alt. 21, „ „ 33 „

Alt. 26, „ „ 30 „

Some specimens are quite imperforate, but more commonly it is more or less perforate.

Pilsbry in Tryon's Manual, vol. vi, p. 172, pl. 39, figs. 82 and 83, describes and figures perforate specimens of this species as *yulei*, but gives a figure of the true *yulei* on plate 23, figures 65 and 66.

Andersoni can be separated from *incei* by its thinner substance, its less oblique, less expanded, and, brown peristome, it is also less openly umbilicated and has half a whorl less,

From *yulei* it can be distinguished by its lighter coloration and narrower bands above, its narrower umbilicus and much less expanded peristome.

5.—T. yulei, Forbes.

Appendix Voy. "Rattlesnake," 1852, p. 377, pl. 2, fig. 6.

= *rainbirdi*, Cox: P.Z.S., 1870, p. 170, pl. 16, fig. 1.*Loc.*—Queensland.

Types in British Museum.

The types of *yulei* and *rainbirdi* are extreme forms, the type of *yulei* being a small light-coloured, and depressed form, whilst the type of *rainbirdi* is large, globose, and darker-coloured; the very large series before me closely connects these two forms.

The broadly-expanded, dark-brown peristome and excavated umbilicus, differentiates this form from its allies.

GROUP OF *frazieri*.

6.—**T. frazeri**, Gray.

Zool. Beechey's Voy. Moll., 1839, p. 143, pl. 38, fig. 6.

= *mossmanni*, Braz.: P.Z.S., 1875, p. 33, pl. 4, fig. 6.

Loc.—New South Wales and Queensland.

This species varies greatly in size and coloration; a specimen before me is of a light yellowish-brown with only one colour band, situated at the suture of the lower whorls; another has an additional one at the periphery of the last whorl, whilst others are nearly covered with dark brown spiral bands. The colour of the peristome varies from black to a light bluish-grey.

Some of the larger forms approach *informis*, Mouss., but the latter can be readily separated by its higher spire and more rapidly increasing whorls.

The shell described as *mossmanni* is a rather globose form of *frazieri* with a black peristome; the original figure is misleading, being much higher in proportion to width, according to the dimensions given in the description.

T. frazeri v. **flavescens**, Hedley.

I have not seen this remarkable variety said to be "of a uniform light yellow, lip pure white."

Loc.—Corumbui Creek, Queensland.

7.—**T. rawnesleyi**, Cox.

P.Z.S., 1873, p. 564, pl. 48, fig. 2.

Loc.—Mt. Elliott, Queensland

A heavy form of a uniform dark brown, with a thick and broadly expanded peristome.

T. rawnesleyi v. **mazee**, Braz.

Proc. Linn. Soc. N.S.W., 1878 (iii), p. 79, pl. 8, fig. 5.

Loc.—Rockingham Bay, Queensland.

From typical *rawnesleyi* this differs chiefly in coloration, having numerous dark-brown spiral bands upon a light yellowish-brown ground; it varies greatly in size and resembles *frazieri*, but can be separated by the thicker peristome and smaller aperture.

All the *frazieri* group have the microscopic waved striation, although it is almost obsolete in some specimens.

In *frazieri* there are generally on the middle whorls more or less conspicuous (under a strong lens) microscopic spiral impressed lines, which I have not seen on specimens of *mazee*.

8.—T. rockhamptonensis, Cox.

P.Z.S., 1873, p. 150.

= *moresbyi*, Angas : P.Z.S., 1876, p. 267, pl. 20, figs. 8, 9.*Loc.*—Rockhampton, Port Denison, Queensland.

A solid form somewhat similar to *rauneseleyi* var. *mazee* in coloration but readily distinguished by its *flat base* and its thinner and darker coloured peristome.

Moresbyi was described from an elevated specimen of *rockhamptonensis*.

T. rockhamptonensis v. **pallida**, Hedley & Musson.

Proc. Linn. Soc. N.S.W., 1891, p. 556.

Loc.—Rockhampton, Queensland.

I have not seen this shell, which is described as “bandless, of a tawny yellow colour.” I thought my *lessoni* v. *lutea* was this variety and sent a specimen of that to Mr. Hedley, but he writes “your shell is quite different, the type specimen of *pallida* is an odd shell, I have seen none like it and now doubt if it is not an abnormal individual.”

GROUP OF *whartoni*.**9.—T. bebias**, Brazier.

Proc. Linn. Soc. N.S.W. (iii), 1878, p. 78.

Loc.—Garden Is., Rockingham Bay, Queensland.

Almost identical with *whartoni* in general appearance, but the umbilicus is less open, some specimens being quite imperforate; may or may not have a circum-umbilical brown patch. The chief distinction between this and *whartoni* is the difference in the microscopic sculpture, the latter consists of closely-set, silk-like, slightly waved striae, whereas in *bebias* it is coarser and more granular.

10.—T. zebina, Brazier.

Proc. Linn. Soc. N.S.W., 1878, p. 78, pl. 8, fig. 2.

Loc.—Douglas River, Queensland

Type in Australian Museum, Sydney.

Very close to *bebias* but thicker, more globose, and its microscopic granulated sculpture is more conspicuous. It is said by Brazier to be imperforate, but I have a slightly perforate specimen before me.

11.—T. whartoni, Cox.

P.Z.S., 1871, p. 55, pl. 3, figs. 5, 5a.

= *mourilyana*, Braz. : P.Z.S., 1895, p. 31, pl. 4, fig. 1.*Loc.*—Port Denison, Queensland.

Type in British Museum.

A thin multi-banded shell approaching some of the varieties of *mulgrarensis*, but distinguished by its microscopical sculpture, which consists of oblique, closely-set, slightly waved, almost straight striae; this sculpture is seen (under the lens) to be quite distinct from that of *bebias* and its allies.

12.—T. cookensis, Brazier.

Proc. Linn. Soc. N.S.W. (i), 1875, p. 17.

= *tomsoni*, Braz. : P.L.S.N.S.W. (i) 1876, p. 97.= *cookensis*, Braz. : Tryon's Man. of Conch., vol. vi., p. 97.*Loc.*—Gould Is., Rockingham Bay, and Frazer's Is., Queensland (not Cooktown, *fide* Brazier).

This has the same microscopic sculpture as *bebias*, but is smaller, darker-coloured, the aperture not quite as broad and slightly less oblique. The shell is of a somewhat thicker substance, and the colour bands do not show clearly through the aperture as in *bebias*, the interior being almost opaque whitish ; the peristome of *cookensis* is also thicker and darker in colour.

13.—T. mulgravensis, Brazier.

Pl. 1, fig. 1.

P.Z.S., 1872, p. 21.

= *mulgravei*, Braz. : Proc. Roy. Soc. Queensland, 1889, p. 101.*Loc.*—Palm Is., N.E. Australia.

With regard to this species, figured here for the first time, there must, I think, have been some error in the dimensions given, viz., alt. 1 in. 1 line ; greater diam. 2 in. 4 lines. (Alt. 27 ; diam. 58 millim). A shell of these dimensions would be a most remarkable form for this group. A specimen from the collection of the late Capt. C. E. Beddome of Tasmania, who had many shells named by Brazier, measuring alt. 32 ; maj. diam. (including peristome) 34 millim., answers better to Brazier's description, "turbinate-globose."

Since writing the above Mr. Charles Hedley has been kind enough to measure the type specimen in the Australian Museum and gives the following dimensions : alt. 30 ; maj. diam. 38 millim.

I have only seen one specimen.

T. mulgravensis v. palmensis, Brazier.

Pl. 1, fig. 5, 6.

Proc. Linn. Soc. N.S.W. (i), 1876, p. 105.

Loc.—Palm Is., Queensland.

An extremely variable form, the typical specimens being solid and globose-conic whilst others are depressed and of thin substance, resembling *whartoni*. The microscopic sculpture is the same as that of *bebias*, but *palmensis* is larger, has the umbilicus more open and is further distinguished by it uniformly coloured peristome (which may be dark or whitish) the colour-bands not extending to the edge as in *bebias*.

T. mulgravensis v. **meridionalis**, Brazier.

Pl. 1, fig. 7, 8.

Proc. Linn. Soc. N.S.W. (i), 1880, vol. 5, p. 458.

Loc.—Palm Is., Queensland.

Described from a young specimen, adult specimens being thicker, and the peristome lighter in colour.

This uniform yellowish variety with a narrow sutural dark-brown band, occurs also with a narrow band, at the periphery of last whorl.

GROUP OF *blomfieldi*, Cox.**14.—T. informis**, Mouss.

Journ. de Conchyl., 1869, p. 59, pl. 4, fig. 3.

Loc.—Port Mackay, Queensland.

The largest species of the group (see note under *frazieri*). A bandless variety occurs of a uniform dark brown with a narrow yellowish subsutural border.

15.—T. blomfieldi, Cox.

Catal. Aust. L. Sh., 1864, p. 19; Monog. Aust. L. Sh., 1868, pl. 1, fig. 1.

= v. *warroensis*, Hed. & Musson: Proc. Linn. Soc. N.S.W. 1891, p. 556, Viag. Magenta, pl. 2, fig. 5.

Loc.—Port Curtis, Queensland.

A distinct species, readily distinguished by its light-coloured earlier whorls, contrasting with the very dark-brown lower ones. Under a strong lens the lower whorls are seen to have more or less obsolete, numerous spiral impressed lines.

The variety *warroensis* is the lighter-brown variety, but specimens before me show various degrees between that and the darker typical colour.

16.—T. coneors, n. sp.

Pl. 1, fig. 3.

= *parsoni*, Pils. (not Cox): Tryon's Man. of Conch., vol. vi., p. 162, pl. 35, figs. 11, 12 (not 13).

Shell sub-globose. solid, narrowly but deeply umbilicated, light-coloured above, with two narrow indistinct light-brown spiral bands on the middle whorls, last whorl of a very dark-brown, with a narrow conspicuous yellowish band at the suture; whorls $4\frac{1}{2}$, last descending in front. Aperture very oblique, rather dark within. Peristome moderately expanded, dark brown, triangularly dilated at point of insertion and partly covering the umbilicus.

Maj. diam. 35; alt 28 millim.

Loc.—Gayndah, Queensland.

This species is very like *blomfieldi* in coloration, but more compressed in form, the umbilicus is more open, and the peristome not so broadly expanded.

It is quite distinct from *curtisiana*, Pfr., although bearing a superficial resemblance to that species.

17.—*T. croftoni*, Cox.

P.Z.S., 1872, p. 18, pl. 4, fig. 1.

Loc.—Hydrometer River, Queensland.

Type in British Museum.

18.—*T. coxi*, Crosse.

Journ. de Conchyl., 1866, p. 195 ; Conchyl. Cab., p. 534, pl. 163, figs. 5, 6.

Loc.—Port Molle and Port Denison, Queensland.Although always easily separated, almost the only difference between *croftoni* and *coxi* is that of coloration.GROUP OF *macleayi*.**19.—*T. oconnellensis*, Cox.**

P.Z.S., 1871, p. 55, pl. 3, figs. 4, 4a

Loc.—The O'Connell River, Port Denison, Queensland.

Type in British Museum.

A distinct form easily distinguished by its basal flatness (the spire varies greatly in height) and broadly excavated umbilical area.

20.—*T. arthuriana*, Cox.

P.Z.S., 1873, p. 564, pl. 41, figs. 1, 1a.

Loc.—L. Is., N. Queensland.

Nearest to the foregoing species, but lighter-coloured above, the last whorl is more rounded and the umbilicus not nearly so broadly excavated.

21.—*T. gratiosa*, Cox.

P.Z.S., 1871, p. 53, pl. 3, figs. 1, 1a.

Loc.—Whitsunday Is., Queensland.

Type in British Museum.

A distinct form, easily recognised.

22.—*T. etheridgei*, Brazier.

Pl. 1, fig. 2.

Proc. Linn. Soc. N.S.W. (ii), 1877, p. 25.

Loc.—Andromache River, N.E. Coast of Australia.

Type in Col. Beddome's collection.

Differs from *gratiosa* in having a white peristome and numerous yellowish spiral bands on lower part of the last whorl. It is probably only a variety of *gratiosa*. I have only seen two examples.**23.—*T. macleayi*, Cox.**

P.Z.S., 1864, p. 485, figs. 1—3.

Loc.—Whitsunday Is., and Port Denison, Queensland.Somewhat similar to *gratiosa* in form, but readily separated by its very different coloration.

GROUP OF *greenhilli*.**24.—T. *greenhilli*, Cox.**

Journ. de Conchyl., 1865, p. 46, ; Monog. Aust. L. Sh., p. 40, pl. 9,
fig. 1 and pl. 18, fig. 8.

Loc.—Upper Denison River, Queensland.

Closely allied to *sardalabiata*, from which it differs in being generally thinner, of a rounder form, darker in colour, and readily separated by its conspicuous (under the lens) microscopical granular sculpture.

Pilsbry, in Tryon's Manual of Conchology, places this under *Baulistes*.

25.—T. *sarda'abiata*, Cox.

P.Z.S., 1871, p. 54. pl. 3, fig. 3.

Loc.—Mt. Dryander, Port Denison, Queensland.

Type in British Museum.

A light straw-coloured shell allied to *greenhilli*.

 POSITION DOUBTFUL.

coarctata, Fér, Hist. Moll., pl. 10b, figs. 6, 7.

Species placed under *Sphoerospira* by Pilsbry in Tyron's Manual of Conchology, but belonging to other sections.

barneyi, Cox. (*Hadra*?).

beddomeae, Brazier. (*Hadra*).

bellemtenkerensis, Brazier. (*Hadra*).

broadbenti, Brazier. (*Sulcobasis*?).

creedi, Cox. (Section?).

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mitchellae, Cox. (*Thersites*).

nicomede, Brazier. (*Hadra*).

wesselensis, Cox. (*Rhagada*).'

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NOTES ON THE ANATOMY OF THE GENERATIVE ORGANS OF ARIOPHANTA JULIANA, GRAY.

By H. OVERTON.

Sutton Coldfield, Warwick.

The specimens which have furnished the following account are some that were collected by the late Mr. Oliver Collett at Galle, Ceylon.

The position of this species in the genus *Ariophanta*, I do not, at present, propose to discuss; like many other members of the genus far too little is known of its internal structure, in fact there is a striking absence of any thorough and detailed statement of the anatomical characters of this genus. Semper (Reisen Arch. Philip. 1870) has given short descriptions of certain organs in different species, and Lieut-Col. Godwin-Austen has still more briefly referred to the generative organs of various species, but his remarks together with the indistinct nature of the drawings illustrating them, are almost useless for purposes of comparison, indeed, it is difficult to attach any serious value to them whatever.

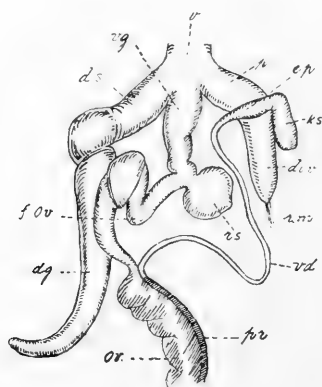


Fig. 1.—Generative Organs, as seen when separated from the external generative orifice.

REFERENCE LETTERS.—*div*, Diverticulum of penis. *d.g.*, Dart gland. *d.s.*, Dart-sac. *c.p.*, Epiphallus. *f.ov.*, Free-oviduct. *ks.*, Kalk-sac. *ov.*, Oviduct. *p.*, Penis. *pr.*, Prostate. *r.m.*, Retractor muscle. *rs.*, Receptaculum seminis. *v.*, Vestibule. *vd.*, Vas deferens. *v.g.*, Vagina.

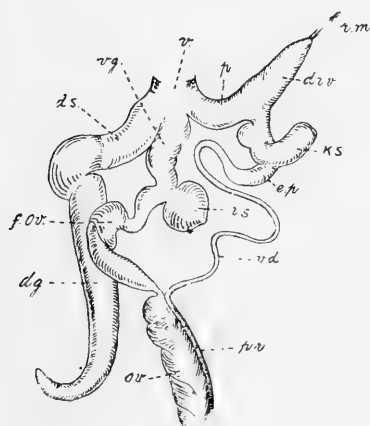


Fig. 2.—Generative Organs, with the penis, etc., turned on one side. Lettering as in Fig. 1.

Externally the generative orifice opens into the vestibule into which the penis opens posteriorly and dorsally, the dart-sac anteriorly and ventrally, and the vagina in the middle.

The vagina is a moderately long tube-like duct, having its internal wall thrown into four longitudinal plications, which are continued into the free-oviduct. At the opening of the receptaculum seminis they form a series of serpentine folds, beyond which they run in a straight series for a short distance, and then in the bulbous portion of the free oviduct they become more numerous and rise up in a very prominent manner. The receptaculum seminis is a heart-shaped sac, and sessile. The penis is a large muscular organ with a thick-walled muscular diverticulum, at the apex of which is the retractor muscle. At the junction of the penis and diverticulum the kalk-sac is given off. This sac is a large muscular body, with smooth internal walls, and in one specimen contained a hard calcareous body measuring 2 by .7 millim., which in all probability was a spermatophore incompletely formed. From the anterior end of this sac the epiphallus is given off, which leads to the narrow vas deferens. The dart-sac is a large muscular tube, and contains a small fleshy dart, which exhibits a concentric ribbing.

Judging from the generative organs this species seems to be nearer to *Euplecta*, Semper, than to *Ariophanta*, s.s.

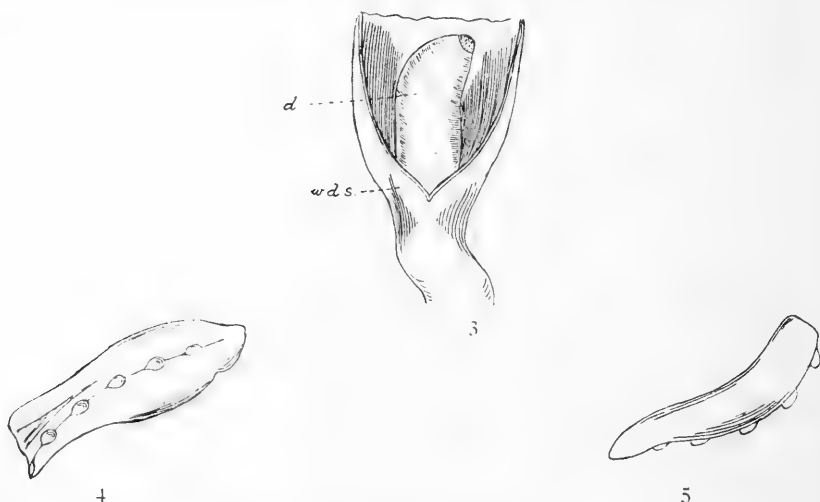


Fig. 3.—Dissection of dart-sac to show the fleshy dart.

Figs. 4 and 5.—Dorsal and lateral views of incompletely formed spermatophore.

REFERENCE LETTERS.—*d.* Dart. *w.d.s.* Wall of dart-sac.

NOTES ON SLUGS AND SLUG-LIKE MOLLUSCS.*

BY WALTER E. COLLINGE, M.Sc.

5.—On a new and interesting genus of Slugs.

Some short time ago I received from Professor Plate of Berlin, a very interesting collection of slugs, numbering upwards of a hundred specimens, mostly belonging to the genus *Veronicella*, Blainville. Amongst these are three slugs, which at first sight I thought belonged to the genus *Atopos*, Simr., but on opening the bottle in which they were contained with some specimens of *Veronicella*, it was at once evident that I had before me a slug which could not be referred to any known genus. Unfortunately Dr. Plate does not know where the specimens were collected; there is one large example and two much smaller specimens.

Externally the large specimen, which measures 75 millim., in length, looks somewhat like a unicoloured *Atopos*; it is a dirty sepia-brown in colour, very slightly keeled posteriorly, the tail end attenuated and the foot-sole extending a little beyond the dorsum. On the sides of the dorsum are a series of seven or eight obliquely directed grooves, rising from the perinotum, and as these pass in a backward direction on the sides of the dorsum they divide in a dendritic manner into finer grooves. The generative orifice is situated on the right side, close to the foot-sole and 44 millim. from the posterior end of the body. The teeth of the radula are as in *Veronicella*.

* See ante, 1903, vol. x, p. 17.

6.—*Arion subfuscus* from the Orkney Isles.

I am indebted to the kindness of Dr. Geo. E. Allan, for a peculiar specimen of *Arion subfuscus*, Drap., collected by him in the Orkney Isles during the summer of 1903.

Externally the specimen is much darker in colour than those usually met with, and the foot-sole and foot-fringe are a light-brown, the former without lineoles.

Internally the chief differences from the normal condition are confined to the generative organs. The typical appearance is so well-known that I need not here describe it, beyond pointing out the very characteristic form which the free-oviduct exhibits in this species. In the specimen under consideration instead of the J-shaped free-oviduct, and the gradually tapering sperm duct, the former was thrown into a series of saccular dilatations and nearly twice as long as usual, while the sperm duct was a fine wavy tube of almost equal dimensions throughout.

I have elsewhere ⁽¹⁾ described and figured the variations met with in the generative organs of this species, in some hundreds of specimens dissected during 1892—1895, and these were exceedingly few. This is the first I have met with since, and quite distinct from any previously described.

7.—Absence of the Male Generative Organs in *Arion hortensis*, Fer.

It may be of interest to record that recently when opening a specimen of this mollusc collected in the south of England, I was somewhat surprised to find the whole of the male portion of the generative organs absent. As in other cases recorded for different species of this genus, the sperm duct, vas deferens, receptaculum seminis and duct, and the prostatic canal, were all wanting.

**PROCEEDINGS OF THE
MIDLAND MALACOLOGICAL SOCIETY.**

47TH MEETING, NOVEMBER 13TH, 1903.

The President in the chair.

EXHIBITS.

By Mr. Guy Breeden : Series of shells of different species of *Limnæa* from various localities.

By Mr. Collinge : A drawer from the Hunter-Barron Collection containing British species of *Limnæa*.

48TH (ANNUAL) MEETING, DECEMBER, 11TH, 1903.

The President in the chair.

The Annual Report of the Council and the Treasurer's statement were read and adopted.

In the absence of any amendments to the Council's nominations, the following

Council and officers were delared elected for 1904.

President—Walter E. Collinge, M.Sc.

Vice-President—E. R. Sykes, B.A., F.L.S.

Treasurer—H. H. Bloomer.

Secretary—H. Overton.

Librarian and Curator—Guy Breeden.

Council—Guy Breeden, H. Willoughby Ellis, F.E.S., H. McClelland, and Bromley Peebles.

EXHIBITS.

By Mr. McClelland : A small collection of South African marine shells.

49TH MEETING, JANUARY 15TH, 1904.

The President in the chair, who delivered his Presidential Address, entitled "Some neglected branches of Malacology."

50TH MEETING, MARCH 11TH, 1904.

The President in the chair.

The Secretary announced and laid upon the table a number of additions to the Library.

EXHIBITS.

On behalf of Mr. McClelland : A very small, but full grown specimen of *Helix nemoralis*.

By Messrs. Collinge, Breeden and Overton : Collections of the British species of *Psidium* from various localities.

CURRENT LITERATURE.

Pilsbry, Henry A.—Manual of Conchology, ser. ii, vol. xvi (pt. 62) pp. 65—128, pls. 19-31, (pt. 63) pp. 129—192, pls. 1—15, (pt. 64), pp. 193—329, (pt. 64a), pp. 1—xl, pls. 16—37. Philadelphia : Academy of Natural Sciences.

Continuing the genus *Brachypodella*, the author describes the Jamaican species, the sub-genera *Simplicervix*, Pilsbry, *Mychostoma*, Albers, with *B. diminuta*, n. sp., *B. alba* (C. B. Ad.), vars. *eos*, *minima*, *striata*, and *occidentalis*, nov., and *Apoma*, Beck.

Turning next to the genus *Pineria*, Poey (Type *P. beathiana*, Poey), the four known species are reviewed.

The genus *Macroceramus*, Guilding, which follows next, stands apart from all other genera of *Urocoptinae*. Anatomically it has not yet been described. The genus is represented in Haiti by three groups of species : the groups of *M. tenuiplicatus*, of *M. klatteanus*, and of *M. lineatus*. In the latter group *M. signatus* var. *salleanus*, *M. richaudi*, vars. *lineatistrigatus* and *sublineatus* are new, as also *M. gabbi* from Santo Domingo. In the group of *M. tenuiplicatus* the var. *swiftianus* of that species is new, and in the *M. klatteanus* group *M. sub-cylindricus* is a new species. The East and Central Cuban species follow.

The next genus *Microceramus*, Pils. and Van., is also undescribed anatomically. The following are described as new : *M. gossei* (Pfr.), var. *providentia*, and *M. peitanius* (Orb.), var. *perconicus*.

The *Megaspiridae*, Pils., are next commenced. The author remarks that the members of this family seem to have been differentiated from their allies, the *Clausiliidae*, in the Northern Hemisphere of the Old World, during Mesozoic time. *Eomegaspira* represents a branch which attained high specialisation at the dawn of the Eocene in Western Europe, and shortly thereafter became extinct, either in consequence of over-specialisation, or as a result of physical changes in the unstable geography of this area. The ancestors of *Perrieria* and *Coelocion* made their way south-eastward to Papua and Australia, while the Brazilian *Megaspira* traces its forebears over the mid-Atlantic, like the *Streptaxidae*, *Ampullariidae*, of the same region, from tropical Africa, whence they migrated to South America over the Cretaceous land-bridge supposed to have spanned the Atlantic.

The following genera are reviewed, *Callioneption*, Pils. and Van., *Megaspira*, "Lea," Jay, *Eomegaspira*, Pils., and *Perrieria*, Tap. Can.

An Index to the *Urocoptidae* and *Megaspiridae* follow, and the author then passes on to the *Achatinidae*.

In this last mentioned family the following genera are treated of : *Pseudachatina*, Albers, with *P. pyramidata*, Kob. v. *kobeltiana*, n. var., *P. daillyana*, n.sp., from West Africa ; *Atopocochlis*, Cr. & Fisch. ; *Pseudotrochus*, H. & A. Ad., with *P. moreletianus* (Desh.) v. *pallidior*, n. var. : *Perideriopsis*, Putz. ; *Limicolaria*, Schum., with *L. tryoniana*, L. *agathina*, L. *lucalana*, and *L. felina*, Shuttl. v. *zebra*, all new and from West Africa ; *L. flammata* (Caill.) v. *smithi* and *L. longa*, both new from East Africa ; *Burtoa*, Bourg., and *Metachatina*, Pils.

The supplementary part (64a) is an exceedingly interesting one, and is entirely devoted to the *Urocoptidae*.

Commencing with a definition of the family, the author passes at once to the general morphology. The general structure of the pallial organs is rather that of the *Bulinulidae* than of the *Clausiliidae*. The generative organs have been examined in a few species of *Eucalodium*, *Coelocentrum*, *Berendtia*, *Anisospira*, *Epirobia*, *Holospira*, *Urocoptis*, and *Brachypodella*. In the first six genera they are characterised by a usually very short, thick penis, with a long epiphallus, the retractor muscle is inserted on the diaphragm, and the receptaculum seminis has a long duct arising not very high on the vagina. In the two remaining genera, the penis is longer, the epiphallus apparently obsolete, and the receptacular duct arises higher. The alimentary canal is long and varies considerably in the different genera, the pharynx or buccal mass, however, is always short, as in the *Helicidae*. The jaw and radula are subject to much variation. Respecting the free retractor muscles, in *Eucalodium* the pharyngeal and left retractors branch from the root of the columellar, and then the ocular, which is thus united for a short distance with the columellar. Anteriorly the two oculars unite to form a muscular plate over the pharynx. In *Coelocentrum* the left ocular and pharyngeal retractor are united for a third of their length, and the pharyngeal retractor gives off a band to each anteriorly. In *Holospira* the left ocular is united part way with the pharyngeal and the right with the columellar muscles. In *Urocoptis brevis* the muscles arise as in *Eucalodium*, but are independent distally, and the right ocular functions also as a penial retractor. Finally in *Brachypodella chemnitziana* the pharyngeal and ocular retractors are united for a third of their length, and the columellar runs free of them. From the morphological right retractor a group of fibres arise which pass to the vas deferens and vagina.

The form, colouration, sculpture, and axis of the shell are next dealt with, followed by a consideration of the significant characters and evolution of the family. It is pointed out that many genera are in the stage termed phylogerontic by Hyatt. They are in the old age of the race, and Dr. Pilsbry believes that many phyla will not outlast the present geological period. Evidences of decadence are seen in the specialisation of the radula, the decreasing growth-power indicated by the fusiform shape of

the shell, and the laxity of coil, while the structure of the axis indicates that many phyla have passed their acme of specialisation, and are on the decline.

Parallel and convergent evolution is well illustrated by certain shell characters, and comparisons are instituted between the shells of the different genera. The geological and zoogeographical data bearing on the family are next reviewed, together with historical notes on the classification and that adopted in the present work. Finally an analytical key to genera completes this valuable and interesting work.

We have long wished to see the biological side of each family dealt with, and it is by no means an easy task the author has had to deal with. The work has been well done, as one would expect from an expert of such great ability, indeed no higher praise can be given to volume xvi than to say it is worthy of the reputation of its author.

In conclusion we must regret, with all malacologists who appreciate this magnificent monograph, the exceedingly careless manner in which the different parts of this volume are stitched. There is no reasonable excuse for stitching nearly three-eighths of an inch into the pages and plates of any work.

Hedley, Charles.—Scientific Results of the Trawling Expedition of H.M.C.S. "Thetis." Mollusca, Part II. Mem. Aus. Mus., 1903, vol. iv, pt. 6, pp. 327—402, pls. xxxvi—xxxviii, and 53 figs. in text.

The second part of Mr. Hedley's paper treats of the Scaphopoda and Gastropoda, and records 4 species of the former, of which 2 are new, and 161 of the latter. 35 of which are new.

Epigrus (Type *Rissoa ischnus*, Tate) is a new genus allied to *Scrobs*, Watson, and *Myva* (*M. cvesa*, n. sp.) is a new genus of the *Pyramellidae*, umbilicate, with few whorls, no columella fold, and the lip produced anteriorly. A new genus of the *Buccinidae* related to *Hindsia* is described under the name of *Fascinus* (Type *F. typicus*, n. sp.). In several points it recalls *Colubraria*, but lacks the varices on the upper whorls, in other *Nassa*, but the pattern of the sculpture is foreign to that genus, while the large apex and absence of columella plications separate it from *Hindsia*.

We note with some disappointment, the absence of anatomical details for any of the new genera or species.

Melville, J. Cosmo and Ponsonby, J. H.—Descriptions of Thirty-one Terrestrial and Fluvial Mollusca from South Africa. Ann. Mag. Nat. Hist., 1903 (s. 7), vol. xii, pp. 595—609, pls. xxxi, xxxii.

This the seventeenth contribution towards the elucidation of the non-marine Molluscan fauna of South Africa, includes descriptions of eleven species of *Ennea*, eight of *Trachycystis*, two of *Ancylus*, and one each of ten other genera.

Trachycystis scolopendra is an interesting species, and perhaps the most remarkable South African Helicoid yet described. *Fauxulus craxfordianus* is a particularly fine and interesting dextral species, with six unusually complicated peristomatal processes. A very handsome species of *Tropidophora*, and a *Chondrocyclus* may also be mentioned.

Eliot, C.—On some Nudibranchs from East Africa and Zanzibar. Part II. Proc. Zool. Soc. Lond., 1903, pp. 250—257.

The author describes two new genera and five new species, none of which, however, are figured.

Ceratophyllidia africana, gen. et. sp. nov., is described from a single specimen, possessing a buccal apparatus similar to that of *Phyllidiopsis*, with the back studded with papillae. *Pleurophyllidiella horatii*, gen. et sp. nov., is also described from a single specimen and appears to be intermediate between *Pleuroleura* and *Pleurophyllidia*. The remaining new species are—*Baeolidia major*, *Cerberilla africana*, and *Ercolania zanzibarica*.

Dall, W. H.—Contributions to the Tertiary Fauna of Florida. Pt. vi. Trans. Wagner Free Inst. Sci. Philad., 1903, vol. iii, pp. xiv, 1219—1654 pls. xlviii—lx.

We heartily congratulate Dr. Dall on the completion of his great work. The first part was issued in 1890, and further parts have been issued from time to time, the sixth completing this invaluable monograph. In all the work comprises upwards of seventeen hundred printed pages and sixty beautiful plates containing over eleven hundred figures.

In the present part the author continues his review of the *Telcodesmacea*, following with the *Anomalodesmacea*, and describes many new species in both orders. The Brachiopoda are next treated of, and finally a most interesting and valuable "Discussion of the Geology" is given.

Dall, W. H. and Bartsch, P.—Synopsis of the Genera, Sub-genera and Sections of the family Pyramidellidae. Proc. Biol. Soc. Washington, 1904, vol. xvii, pp. 1—6.

The authors recognise four genera, viz., *Pyramidella*, Lam., *Turbonilla*, Risso, *Odotomia*, Flehm., and *Murchisonella*, Mörch. The first genus is then divided into 24 sub-genera and sections of which the following are new: *Milda*, (Type *Obeliscus ventricosus*, Quoy), *Voluspa* (Type *Pyramidella auricoma*, Dall), *Callolongchaeus* (Type *P. jamaicensis*, Dall), *Ulfia* (Type *P. (Ulfia) cossmanni*, nom. nov. = *Syrnola striata*, Cossm.), *Tropaeus* (Type *P. subulata*, A. Ads.), *Vagna* (Type *P. paumotensis*, Tryon), *Cossmannica* (Type *P. clandestina*, Desh.), *Orinella*, nom. nov. (Type *Orina pinguicula*, A. Ads.), *Sulcorinella* (Type *P. (S.) dodona*, n. sp.), *Iphia* (Type *Syrnola densistriata*, Garrett), and *Syrnolina* (Type *Syrnola rubra*, Pse.).

The second genus is divided into 21 sub-genera and sections the following being new: *Saccoina*, nom. nov. (Type *Spica monterosatoi*, Sacco), *Visma* (Type *Eulimella tenuis*, Sby.), *Lancella*, nom. nov. (Type *Turbonilla (Lancea) elongata*, Pse.), *Asmunda* (Type *Chemnitzia turrata*, C. B. Ad.) and *Baldr* (Type *Turbonilla (B.) archeri*, n.sp.).

The genus *Odotomia* contains 40 sub-genera, the following 10 being new: *Villia* (Type *O. (V.) pilsbryi*, n.sp.), *Folinella* (Type *Amoura anguliferens*, De Fol.), *Besla* (Type *Chrysallida convexa*, Cpr.), *Egila* (Type *C. lacunata*, Cpr.), *Haldra* (Type *C. photis*, Cpr.), *Ividia* (Type *Parthenia armata*, Cpr.), *Evalina* (Type *O. (E.) americana*, n.sp.), *Stomega* (Type *O. cinspicua*, Ald.) *Heida* (Type *Syrnola caloosensis*, Dall), and *Lysacme* (Type *Chrysallida clausiliformis*, Cpr.).

Kennard, A. S. and Woodward, B. B.—Holocene Deposits at Clifton Hampden, near Oxford. Proc. Cotteswold Nat. Field Club, 1903, vol. xiv, pp. 191—203.

The authors record 54 species of land and freshwater shells from three beds on the banks of the Thames at Clifton Hampden, of which 15 are land and 39 freshwater forms. As the authors remark it is not often that in these recent deposits any marked super-position of beds occurs, hence the importance of the present section, in which Bed A. yielded 30, Bed B. 49, and Bed C. 26 species.

Knight, G. A. F.—A Visit to the Outer Hebrides in search of Mollusca. Trans. Perthshire Soc. Nat. Sci. 1903, vol. iii, pp. 193—217.

Mr. Knight gives an interesting account of a holiday spent in the Outer Hebrides in search of Mollusca. He records 71 species and 9 varieties of marine molluscs, 8 species and 1 variety of land, and 1 species and variety of freshwater.

Collinge, Walter E.—Report on the Non-operculate Land Mollusca. Fasciculi Malayenses, Zoology, 1904, vol. i, pp. 205—218, pl. xi—xiii.

The author describes the collection made by Messrs. Annandale and Robinson during 1901—2 in the Malay Peninsula.

A new species of *Damayantia* is described and one of *Parmarion*, also one of the genus *Atopos*.

After examining the anatomy of the *Helicarion lowi* of de Morgan, Mr. Collinge is of opinion that it can not be retained in that genus. It is closely related to certain species of *Ariophanta*, and he suggests that it should be placed in the genus *Nilgiria*.

The variety *martensi* of *Hemiplecta salangana* is also new, as well as the variety *globosus*, Fulton, of *Amphidromus perakensis*, Fult.

McIntosh, Prof.—The Story of a Pearl. Zool., 1904 (s. 4), vol. viii, pp. 41—56, pl. 1.

Professor McIntosh gives interesting account of the views of the earlier writers on pearl formation, as well as those of recent times.

Lebour, Marie V.—Additions to the List of Marine Mollusca of Northumberland. Report Northumberland Sea Fish. Comm., 1903, p. 50.

The authoress adds to her previous lists, *Limapontia nigra*, Johnst., *Goniodoris nodosa*, (Mont.), *Doris bilamellata*, L., and *Trochus helicius*, Fabr.

Thiele, Joh.—Anatomisch-systematische Untersuchungen einiger Gastropoden. Wiss. Ergeb. deutschen Tiefsee-Exped. a. d. Dampfer "Valdivia" 1898—1899, 1903, Bd. vii, pp. 149—174, Tfn. vi—ix.

Bavay, A. and Dautzenberg, Ph.—Description de coquilles nouvelles de l'Indo-Chine. Journ. de Conchyl. 1903, vol. li, pp. 201—236, pls. vii—xi.

The authors in this their third contribution to the mollusca of the Indo-China region, describe and figure numerous new species and varieties, amongst those we may number as especially interesting: *Streptaxis (Odontartemon) mabillei*, *Sitala acutecarinata*, *Boysidia messageri* and *gereti*, and *Helicomorpha scalaroides*. In addition to the new species, figures are also given of some hitherto unfigured.

EDITOR'S NOTES.

The Editor again appeals to those subscribers whose subscriptions are one, two or three years in arrear to kindly forward the same. Unless these subscriptions are paid during the present year, the question of the continued publication of the Journal will have to be seriously considered.

We note with much pleasure the election of our editorial colleague, Mr. E. R. Sykes, to the Presidency of the Malacological Society of London.

THE
JOURNAL OF MALACOLOGY.

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JULY 11TH, 1904.

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Recd Aug 2/04

ON A COLLECTION OF MARINE SHELLS FROM
PORT ALFRED, CAPE COLONY.

By EDGAR A. SMITH, I.S.O.,

British Museum (Natural History) London.

(Plates ii, iii.)

IN the early part of last year the British Museum received from Lieut.-Col. W. H. Turton, R.E., a large series of shells collected by him at Port Alfred, Cape Colony. The collection is of interest, as it contains a considerable number of new forms and also a few others which are new to the known fauna of South Africa. It also shows how rich in species this particular locality evidently is. It has been thought useful and interesting to give a list of the species as all were obtained at one place and within the short period of two or three months. Besides the species enumerated, there are numerous specimens which, being beach-rolled, (the whole collection having been obtained on the shore), are beyond recognition. Others are too young to be dealt with and a few belong to families, *Vermetidae*, *Ostracidae*, etc., which are extremely difficult to determine. Probably altogether about fifty species are comprised in this unnamed material which are not included in the following list, and Colonel Turton writes that he has upon a second visit to Port Alfred found a considerable number of species which were not in his first collection. It is not therefore improbable that some four hundred and fifty species will eventually be recorded from this one locality.

All the species about to be enumerated, excepting those new to the fauna,⁽¹⁾ are quoted and references given, either in Sowerby's "Marine Shells of South Africa," or in my paper in the Proc. Malacol. Soc., vol. v, pp. 354—402.

1. Marked in the list with an asterisk.

A. LIST OF SPECIES.

- Spirula peroni*, Lamk.
Melampus acinoides, Morelet.
Gadinia costata, Krauss.
 **Ampullarina africana*, n.sp.
Siphonaria concinna, Sowb.
Siphonaria capensis, Q. & G. var.
Siphonaria aspera, Krauss.
Bulla ampulla, Linn.
Hydatina physis, Linn.
Haminea natalensis, Krauss.
Cylichna cylindracea, Pennant.
Tornatina voluta, Q. & G.
Actaeon albus, Sowb.
Retusa truncatula, Brug.
Terebra capensis, Smith.
 **Terebra suspensa*, n.sp.
Conus infrenatus, Reeve.
Conus pictus, Reeve.
Conus bairstowi, Sowb.
Conus tinianus, Hwass.
Clionella kraussi, Smith.
Clionella bipartita, Smith.
Clionella subventricosa, Smith.
Clionella rosaria, Reeve.
Clionella sinuata, Born. var.
Clionella (?) *platystoma*, Smith.
Clavatula gravis, Hinds.
Pleurotoma fultoni, Sowb.
Drillia rousi, Sowb.
Drillia caffra, Smith.
Drillia layardi, Sowb.
Drillia diversa, Smith.
Drillia bairstowi, Sowb.
Drillia hottentota, Smith.
 **Drillia albonodulosa*, n.sp.
 **Drillia thetis*, n.sp.
 **Drillia nivosa*, n.sp.
 **Drillia subcontracta*, n.sp.
 **Drillia praetermissa*, n.sp.
Clathurella capensis, Smith.
Clathurella ponsonbyi, Sowb.
Clathurella grayi, Reeve.
 **Clathurella crassilirata*, n.sp.
Clathurella verrucosa, Sowb.
Mangilia septangularis, Mont.
Mangilia amplexa, Gld.
 **Mangilia alfredi*, n.sp.
Daphnella (?) *sulcata*, Sowb.
Daphnella capensis, Sowb.
 (= *Columbella capensis*.)
 **Glyphostoma siren*, n.sp.
Mitromorpha volva, Sowb.
Alcira elegans, H. Ad.
Columbella lightfooti, Smith.
Columbella pyramidalis, Sowb.
Columbella algoensis, Sowb.
Columbella albuginosa, Rve.
Columbella cerealis, Menke.
 **Columbella adjacens*, n.sp.
Cancellaria semidisjuncta, Sowb.
Cancellaria foveolata, Sowb.
Ancilla obtusa, Swainson.
 **Ancilla reevei*, n.sp.
Ancilla obesa, Sowb.
Ancilla fasciata, Rve.
Ancilla albozonata, n.sp.
 (= *A. cinnamomea*, Sowb. non Lank.)
Ancilla marmorata, Rve.
Marginella ornata, Redfield.
Marginella mosaica, Sowb.
Marginella piperita, Hinds.
Marginella bairstowi, Sowb.
Marginella albocincta, Sowb.
Marginella punctilineata, Smith, var.
Marginella neglecta, Sowb.
Marginella zonata, Kiener.
Marginella keenii, Marratt.
 **Marginella pura*, n.sp.
Marginella pellicula, Marratt ?
Marginella burnupi, Sowb.
 **Marginella differens*, n.sp.
Marginella cylindrica, Sowb.
Marginella algoensis, Smith.
Marginella fallax, Smith.

- **Marginella corusca*, Reeve.
 **Marginella dulcis*, n.sp.
 **Marginella munda*, n.sp.
 **Marginella pseutes*, n.sp.
Voluta africana, Rve.
Mitra picta, Rve.
Mitra latruncularia, Rve.
Mitra patula, Rve.
Mitra merula, Sowb.
Mitra capensis, Dkr.
Mitra canaliculata, Sowb.
Mitra euzonata, Sowb.
Mitra bathyraphe, Sowb.
Mitra kowiensis, Sowb.
Fasciolaria heyneimanni, Dkr.
Latirus rousi, Sowb.
Latirus bairstowi, Sowb.
Fusus ocelliferus, Bory, var. *robustior*, Sowb.
 **Fusus cingulatus*, n.sp.
Melapium lineatum, Lamk.
Cominella lagenaria, Lamk.
Cominella tigrina, Kiener.
Cominella porcata, Gmelin.
Cominella elongata, Dkr.
Cominella unifasciata, Sowb.
Cominella puncturata, Sowb.
Cominella capensis, Dkr.
Cominella angusta, Sowb.
Tritonidea insculpta, Sowb.
Euthria fuscotincta, Sowb.
Sylvanocochlea ancilla, Hanley.
Eburna papillaris, Sowb.
Nassa crawfordi, Sowb.
Nassa pulchella, A. Ad.
Nassa poecilosticta, n.sp.
 (= *N. coccinea* (A. Ad.), Sowb.)
Nassa pyramidalis, A. Ad.
Nassa speciosa, A. Ad.
Nassa serotina, A. Ad. var.
Nassa kraussiana, Dkr.
Nassa (*Demoulia*) *abbreviata*, Gmel.
Nassa retusa, Lamk.
Bullia callosa, Wood.
- **Bullia trifasciata*, n.sp.
Bullia laevisissima, Gmel.
Bullia tenuis, Rve.
Bullia annulata, Lamk.
Bullia rhodostoma, Gray.
Bullia semiusta, Rve.
Bullia diluta, Krauss.
Bullia pura, Melvill.
Murex uncinarius, Lamk.
Murex scrobiculatus, Dkr.
Murex babingtoni, Sowb.
Murex kieneri, Rve.
Murex crawfordi, Sowb.
Trophon insignis, Sowb.
Purpura capensis, Petit.
 **Purpura texturata*, n.sp.
Purpura squamosa, Lamk.
Purpura cataracta, Chemn.
Purpura castanea, Küster.
 (Syn. *Cominella unifasciata*, Sowb.)
Latiaxis rosaceus, Smith.
Coralliophila rubrococcinea, Melv. & Standen.
Lotorium sauliae, Rve.
Lotorium africanum, A. Ad.
Lotorium leucostoma, Lamk. var.
Lotorium doliarium, Lamk.
Lotorium klenei, Sowb.
Lotorium olearium, Desh.
Lotorium argus, Lamk.
Ranella granifera, Lamk.
Ranella anceps, Lamk.
Cassis achatina, Lamk.
Dolium dunkeri, Hanley.
Radius aurantia, Sowb. ?
Cypraea citrina, Gray. var.
Cypraea edentula, Sowb.
Cypraea minoridens, Melvill.
Cypraeovula capensis, Gray.
Trivia oniscus, Lamk.
Trivia vesicularis, Gaskoin.
Trivia formosa, Gaskoin.
Trivia oryza, Lamk.
Cerithium pingue, A. Ad.

- **Cerithiopsis trilineata*, Phil.
Cerithiopsis exquisita, Sowb.
Cerithiopsis foveolata, Sowb.
Trifora perversa, Linn.
 **Trifora convexa*, n.sp.
 **Trifora fuscomaculata*, n.sp.
Trifora cingulata, A. Ad.
 **Trifora fuscescens*, n.sp.
Turritella carinifera, Lamk.
Littorina knysnaensis, Phil.
Littorina africana, Phil.
Diala dubia, Sowb.
Diala pinnae, Krauss, var?
Assiminea bifasciata, Nevill.
Assiminea umlaasiana, Smith.
 **Rissoina alfredi*, n.sp.
Rissoina elegantula, Angas.
Rissoa fenestrata, Krauss.
 **Rissoa perspecta*, n.sp.
Rissoa argentea, Sowb.
 **Rissoa conspecta*, n.sp.
Rissoa (Cingula) caffra, Sowb.
Torinia dorsuosa, Hinds.
Torinia variegata, Gmelin.
Crepidula (Crypta) aculeata, Gmelin.
Crepidula (Crypta) adspersa, Dkr.
Crepidula (Trochita) helicoidea, Sowb.
Crepidula (Mitrella) chinensis, Linn.
Natica imperforata, Gray.
Natica forata, Rve.
 **Natica decipiens*, n.sp.
 **Natica napus*, n.sp.
Natica didyma, Bolten.
Ianthina globosa, Swains.
Ianthina communis, Lamk.
Ianthina exigua, Lamk.
Scala aculeata, Sowb. var.
Scala coronata, Lamk.
Scala fragilis, Hanley?
Scala lactea, Krauss.
 **Acrilla gracilis*, H. Ad.
Syrnola capensis, Sowb.
 **Mormula rissoina*, A. Ad.
 **Turbonilla hofmani*, Angas.
Turbonilla tinctoria, Sowb.
Turbonilla laevicostata, Sowb.
Turbonilla tegulata, Sowb.
 **Turbonilla gemmula*, n.sp.
Turbonilla bathyraphe, Sowb.
 **Turbonilla decora*, n.sp.
Cingulina circinata, A. Ad.
Odostomia robusta, Sowb. var.
Odostomia lavertinae, Smith.
Odostomia (Ondina) lucida, Sowb.
Miralda crispa, Sowb.
Graphis pellucida, Sowb.
Eulima distorta, Desh.
 **Eulima distincta*, n.sp.
Eulima dilecta, Smith.
Eulima langleyi, Sowb.
Eulima simplex, Sowb.
 **Eulimella nivea*, n.sp.
 **Eulimella minor*, n.sp.
Niso balteata, Sowb.
 **Niso interrupta*, Sowb.
Astridium taylorianum, Smith.
Turbo (Ocana) cidaris, var. *natalensis*.
Turbo (Samarticus) sarmaticus, Linn.
Leptothyra sanguinea, Linn.
 **Leptothyra armillata*, A. Ad.
Phasianella elongata, Krauss.
Phasianella kochi, Phil.
Phasianella bicarinata, Dkr.
Phasianella capensis, Dkr.
Clanculus miniatus, Anton.
Calliostoma bicingulatum, Lamk.
Gibbula tryoni, Pilsbry.
Gibbula multicolor, Krauss.
Gibbula benzi, Krauss.
Gibbula fucata, Gld.
Gibbula cicer, Menke.
Oxystele impervia, Menke.
Oxystele tabularis, Krauss.
Oxystele tigrina, Chemn.
Oxystele merula, Chemn.
 **Cynisca forticostata*, n.sp.
Cyclostrema planulata, Sowb.
 **Ethalia africana*, n.sp.

- Haliotis sanguinea*, Hanley.
Haliotis midae, Linn.
Pupillia aperta, Sowb.
Fissurellidaea hiantula, Lamk.
Fissurellidaea concatenata, Cr. & Fisch.
Fissurella natalensis, Krauss.
Glyphis elizabethae, Smith.
Glyphis calyculata, Sowb.
Glyphis spreta, Smith.
Glyphis elevata, Dkr.
Patella variabilis, Krauss.
Patella rustica, Linn. ?
Patella umbella, Gmelin.
Patella granularis, Linn.
Patella argenvillei, Krauss ?
Patella plicata, Borni.
Patella longicosta, Lamk.
Patella oculus, Borni.
Patella (Olana) cochlear, Gmelin.
Patella (Patina) pruinosa, Krauss.
Helcion pectinata, Linn.
Chiton tulipa, Q. & G.
Callochiton castaneus, Wood.
Dinoplax gigas, Gmelin.
Acanthochites garnoti, Blainville.
Dentalium belcheri, Sowb.
Lima rotundata, Sowb.
 * *Lima perfecta*, n.sp.
Pecten tinctus, Reeve.
Margaritifera capensis, Sowb.
Mytilus (Chloromya) perna, Linn.
Mytilus (Aulacomya) variabilis, var ?
 * *Modiola tenerrima*, n.sp.
Modiola petagnae, Scacchi. var ?
Modiola lignea, Reeve.
Modiolaria coenobita, Vaillant.
Arca lactea, Linn.
Arca obliquata, Wood.
Glycimeris queketti, Sowb. jun. ?
 * *Limopsis pumilio*, n.sp.
 * *Hochstetteria velaini*, n.sp.
 * *Hochstetteria limoides*, n.sp.
Thecalia concamerata, Brug.
Carditella rugosa, Sowb.
 * *Carditella laticostata*, n.sp.
Neocardia angulata, Sowb.
Cardita elata, Sowb.
 * *Cardita minima*, n.sp.
Crassatella acuminata, Sowb.
Cardium turtoni, Sowb.
Cardium natalense, Sowb.
Dosinia hepatica, Lamk.
Venus verrucosa, Linn.
Meretrix (Tivela) compressa, Sowb.
Meretrix (Chione) kochi, Phil.
Sunetta ovalis, Sowb.
Circe pectinata, Linn.
Tapes corrugatus, Gmelin.
Venerupis robusta, Sowb. ?
Schizodesma spengleri, Gmelin.
Mactra ovalina, Lamk.
Standella solandri, Gray.
 (Syn. *Petricola lyra*, Melvill).
Gastrana abilgaardiana, Spengler.
Tellina rosea, Spengler.
Tellina natalensis, Krauss.
Tellina ponsonbyi, Sowb.
Tellina triangularis, Chemn.
 * *Tellina regularis*, n.sp.
Psammotellina capensis, Sowb.
Macoma littoralis, Krauss.
Macoma cumana, Costa, var. ?
Donax serra, Chemn.
Donax sordidus, Hanley.
 * *Semele capensis*, n.sp.
 * *Theora ovalis*, n.sp.
Solen capensis, Fischer.
Cultellus decipiens, n.sp.
 (= *pellucidus*, Sowb. non Pennant).
Loripes clausus, Philippi.
 (= *L. lacteus*, Sowb. non Linn).
Lucina despecta, n.sp.
 (= *L. columbella*, Sowb. non Lamk.)
 * *Lucina valida*, n.sp.
Cryptodon globosus, Forsk.
Felania subradiata, Sowb.
 * *Pholas fragilis*, Sowb.
Nucula nucleus, Linn.

- | | |
|------------------------------------------|---------------------------------------|
| * <i>Tellimya similis</i> , n.sp. | <i>Kellia rotunda</i> , Desh. |
| * <i>Montacuta macandrewi</i> , Fischer. | <i>Kellia mactroides</i> , Hanley. |
| <i>Lasaea australis</i> , Soubervie. | * <i>Lepton fortidentatus</i> , n.sp. |

B. DESCRIPTIONS OF NEW SPECIES AND REMARKS UPON A FEW
OTHER PREVIOUSLY DESCRIBED FORMS

***Drillia thetis*, n.sp.**

Pl. ii, fig. 1.

Testa parva. ovato-fusiformis, alba, rufescens, vel fuscescens; anfractus normales 5 convexi, costis obliquis leviter flexuosis (in anfr. penultimo 10—12) instructi, inter costas spiraliter tenuiter striati, sutura obliqua sejuncti, ultimus infra medium contractus, costis inferne evanidis, et pone labrum interdum plus minus obsoletis; apertura parva, irregulariter sub-ovata, longit. totius $\frac{2}{3}$ fere aequans; labrum tenue, arcuatim prominens, superne late sed haud profunde sinuatum; columella leviter arcuata, callo tenui induta.

Longit. 10 millim., diam. 4; apertura 4 millim. longa, 2 lata.

The rather convex whorls, the oblique and slightly flexuous ribs and the close fine spiral striae, are the principal features of this species. It seems to be variable in colour, some specimens being entirely white, others reddish or brownish. Some white examples have a brown zone below the suture and another round the middle of the body-whorl, and one pale specimen has some distant, obscure, reddish spots upon the upper part of the whorls. The spiral striae are most conspicuous between the costae.

***Drillia subcontracta*, n.sp.**

Pl. ii, fig. 2.

Testa elongata, fusca, ad apicem mamillata, anfractus 8, superiores duo laeves, convexi, caeteri supra concavi, infra convexi, costis obliquis circiter 12, supra attenuatis, instructi, inter costas spiraliter fortiter striati, ultimus infra medium contractus, et costis obsoletis circa basim sulcatus; apertura sub-ovalis, supra et infra contracta, longit. totius circiter $\frac{1}{3}$ aequans; labrum tenue, haud profunde sinuatum; columella oblique arcuata, callo tenui pallido induta.

Longit. 12 millim., diam. 4.5; apertura 4 millim. longa, 2 lata.

The body-whorl is well rounded at the middle and then contracted below. A spiral striation or groove at the periphery, which also winds up the spire just above the suture, is usually more strongly marked than the rest.

Drillia albonodulosa, n. sp.

Pl. ii, fig. 3.

Testa parva, rufo-fusca, serie nodulorum alborum cincta, ovato-fusiformis ; anfractus sex, superiores rotundati, laeves, caeteri supra excavati, infra convexi, costis nodiformibus albis obliquis infra instructi, spiraliter striati, ultimus ad medium nodose costulatus, infra circa basim oblique et fortius striatus ; apertura parva ; labrum ad marginem tenue, extus incrassatum, supra valde sinuatum ; columella rectiuscula, callo tenui superne tuberculiforme induta.

Longit. 8.3 millim., diam. 4 ; apertura 3.3 millim. longa, 1.5 lata.

A solid little species, well characterised by its style of colouration.

Drillia praetermissa, n. sp.

Pl. ii, fig. 4.

Testa breviter subfusiformis, fuscescens, pallide costulata, rufo-fusco maculata, lineis spiralibus albo et fusco articulatis subobscuris ornata ; anfractus 8—9, apicales ?, caeteri supra concave declives, infra convexiusculi, costis obliquis 12—15 in concavitate obsoletis instructi, spiraliter tenuiter striati, ultimus costis infra medium evanidis, circa basim fortius strictus ; apertura longit. totius $\frac{1}{4}$ adaequans, intus fuscescens ; labrum arcuatim prominens, tenue, supra rotunde sinuatum ; columella fere recta, callo tenui supra tuberculiforme induta.

Longit. 18 millim., diam. 7.

Allied to *D. nirosa*, but differing in colour and in its spire being more produced.

Drillia nivosa, n. sp.

Pl. ii, fig. 5.

Testa mediocriter elongata, pallide fuscescens, lineis numerosis spiralibus albo et fusco-punctulatis ornata ; spira elongata, ad apicem mammillata ; anfractus 7, duo superiores rotundati, laeves, caeteri supra concavi, infra convexi, costis obliquis (in concavitate obsoletis) 12—14 instructi, et spiraliter leviter striati, ultimus infra medium costis evanidis, circa basim fortius striatus ; apertura longit. totius circiter $\frac{3}{8}$ adaequans ; labrum tenue, arcuatum, supra subprofunde sinuatum ; columella levissime curvata, callo tenui, superne tuberculiforme indutum.

Longit. 17 millim., diam. 6.5 ; apertura 6.5 longa, 3 lata.

Two or three of the dotted lines around the middle of the whorls are more clearly defined than the rest. The specific name has reference to the white specks which cover the surface.

Clathurella crassilirata, n. sp.

Pl. ii, fig. 6.

Testa parva, fusiformis, albida, infra suturam et circa basim fuscotincta ; anfractus 7 ?, supra declives, infra liris duobus crassis spiralibus rotundatis

instructi, ultimus triliratus, infra concave contractus et oblique striatus; apertura longit. totius circiter $\frac{3}{2}$ aequans; labrum supra ad suturam profunde et rotunde sinuatum, antice rufotinctum; columella rectiuscula, vel leviter sinuosa, callo tenui induta.

Longit. 8 millim., diam. 3.5.

Well characterised by the strong rounded spiral lirae and the deep labral sinus.

Glyphostoma siren, n. sp.

Pl. ii, fig. 7.

Testa parva, oblonga, dilute fuscescens, circa medium anfract. ultimi albo zonata; spira gradata, ad apicem obtusa; anfractus 5, superiores $1\frac{1}{2}$ laeves, convexi, caeteri convexiusculi, costis longitudinalibus circiter 10 et liris spiralibus (in anfr. ultimo 3—4) cancellati, ultimus liris circiter 10 cinctus; apertura angusta, longit. totius $\frac{1}{2}$ haud aequans; labrum incrassatum, superne conspicue sinuatum, intus sex-denticulatum; columella rectiuscula, callo tenui induta, tuberculis 2—3 minutis in medio munita.

Longit. 5.5 millim., diam. 2.3; apertura 2.5 millim. longa, 1 lata.

A rather strongly cancellated species, of a pale brownish colour with a zone round the middle of the body-whorl, which is also partly visible above the suture of the spire.

Daphnella (?) sulcata (Sowerby).

Cominella (?) sulcata, Sowerby: Marine Shells S. Afr., p. 11, pl. i, fig. 10, bad!

Hab.—Port Elizabeth (Sowb.).

The type of this species is in poor condition, so that certain features appear to have been overlooked in the original description. Of the six whorls the two apical ones are smooth, rounded, conspicuously large and mamilliform; the rest are rather convex and spirally grooved and ridged. They also exhibit lines of growth in the sulci, producing a sub-cancellated appearance, and the spirals are also faintly sub-granose. The labrum is a little thickened, ascends slightly upon the whorl above, and has a few minute tubercles upon the thickening within. The spiral lirae are about seven in number on the penultimate whorl and eighteen to twenty upon the last.

This species does not fall conveniently into any known genus, and although placed provisionally in the genus *Cominella* by Mr. Sowerby, it might with equal propriety be located in *Tritonidea*. In size and some other respects it recalls the general facies of some forms of *Daphnella*.

Most examples are uniformly light corneous and generally have a row of brown spots at the middle of the body-whorl, which is also continued up the spire.

Mangilia alfredi, n. sp.

Pl. ii, fig. 8.

Mangilia costata, Sowerby (nec Donovan) : Marine Shells. S. Afr. p. 7.*Hab.*—Algoa Bay (Sowb.).

This South African species differs from *M. costata* in form, the aperture being shorter and broader, also in the six or seven ribs being more regularly continuous up the spire, and especially in the much stronger spiral striation. The striae are close-set, hair-like, continued on and between the costae, and are easily observable under a simple lens. The colour is somewhat variable. Some specimens are white with a broad band round the middle of the body-whorl. Others are light brownish, and with or without a darker peripheral zone.

Ancilla albozonata, n. sp.

Pl. ii, fig. 9.

Testa oblonga, supra acuminata, fusca, ad apicem alba, infra suturam et infra medium anfractus ultimi et circa basim albozonata; spira convexe acuminata, callo tenui induta; apertura elongata, longit. totius circiter $\frac{7}{10}$ aequans, intus fusca, antice infra columellam alba; labrum tenue, parum arcuatum, supra ad insertionem album, antice ad extremitatem zonae externae albo tinctum; columella antice quasi reflexa, oblique sulcata, fuscescens.

Longit. 20 millim., diam., 10; apertura 14 longa, 4.5 lata.

The coloration of this species is characteristic and constant. The top of the spire is white, a white band falls round the upper part or shoulder of the body-whorl, a narrower white zone accompanies the upper of the two oblique grooves across the lower part of the whorl, the base of which is also white. The surface is smooth, exhibiting only faint lines of growth.

Smaller than *A. cinnanomea*, Lamk., from the Red Sea, and differently coloured. It is the *cinnanomea* of Sowerby's "Marine Shells of S. Africa," p. 16.

Ancilla reevei, n. sp.

Pl. ii, fig. 10.

Testa elongato-ovata, pallide carnicolor, infra suturam pallidior, laevis; spira plus minus callo pallido induta; anfractus 5?, ultimus magnus, elongatus, convexusculus, antice oblique bisulcatus, cingulo inter sulcos fusco maculato; labrum pallidum, parum arcuatum; columella antice incrassata, quasi reflexa, oblique sulcata, alba, vel dilute rosea.

Longit. 22 millim., diam. 10; apertura 12.5 millim. longa, 4.5 lata.

The colour is a pale fleshy tint, with a whitish or brownish zone beneath the suture, sometimes with a series of brown spots or dots upon the lower edge of it. The oblique girdle upon the front part of the body-whorl is also generally spotted with red. The reflexed columella is margined on the left side with an excavation or groove.

Fusus cingulatus, n. sp.

Pl. ii, fig. 11.

Testa breviter fusiformis, rimata, aurantia, ad angulum anfractuum albo cincta; anfractus 6, duo superiores globosi, laeves, caeteri supra oblique declives, in medio angulati et serie nodulorum instructi, tenuiter spiraliter lirati; ultimus lira conspicua paulo infra medium cinctus, antice in rostrum brevem productus; apertura supra irregulariter ovata, antice in canalem obliquum brevem producta; labrum simplex, tenue; columella arcuata, laevis, callo tenui albo induta.

Longit. 28 millim., diam. 14; apertura cum canali 14 millim. longa, 5.5 lata.

Recognisable by its style of colouration and the infraperipheral conspicuous lira. The nodules at the angle of the whorls gradually increase in size with the growth of the shell. There are about nine on the body-whorl.

Terebra suspensa, n. sp.

Pl. ii, fig. 12.

Terebra pertusa, Sowerby (nec Born): Marine Shells S. Afr., p. 24.

Testa parva, elongata, alba, pallide fusco maculata, ad apicem fuscens; anfractus 12, duo superiores (protoconcha) laeves, dilute fusci, rotundati, mammaeformes, caeteri lente accrescentes, leviter convexi, paulo infra suturam subconstricti, costis longitudinalibus numerosis tenuibus arcuatis instructi, inter costas spiraliter punctati, ultimus ad peripheriam rotundatus, circa basim zona fusca cinctus; apertura parva; columella alba, brevis, rectiuscula, antice obliqua; canalis brevissimus, obliquus.

Longit. 20 millim., diam. 4.5; apertura 4 millim. longa, 2 lata.

Hab.—Port Elizabeth (Sowb.).

This species differs from *T. pertusa* of Born in its much smaller size, finer and more numerous spiral series of punctures, rather shorter whorls, and in colour. The dark infrasutural band, so characteristic of *T. pertusa*, is wanting in the present species. The upper part of the whorls in Born's species is smooth between the riblets and is marked off by a conspicuous row of punctures, whereas in *T. suspensa* it is punctate between the costae, and less clearly defined.

Columbella (?) pyramidalis, Sowerby.

Columbella (Mitrella) pyramidalis, Journ. Conchol., Vol. vii, p. 370; Marine Shells S. Afr. Append., p. 10, pl. vi, fig. 4.

Hab.—Port Elizabeth (Sowb.).

Variable in colouration, sometimes being white, streaked with brown at intervals, and generally with an interrupted narrow opaque white line at the periphery, sometimes bordered above with a brown line which ascends the spire above the sutural line. Some specimens are pale brown, streaked or mottled with white, and dotted with brown at the pale periphery and upon the slight infrasutural margination. The lower part of the body-whorl in some of these specimens is whitish. The species has a *Terebra*-like appearance.

Mitromorpha volva, Sowerby, **var.**

Pl. ii, fig. 13.

Testa ovato-fusiformis, supra pallide fuscescens, infra albida, circa medium anfract. ultimi fusco notata vel zonata; spira conica, ad apicem mamillata; anfractus 6, superiores duo laeves, rotundati, caeteri spiraliter lirati (liris in anfr. penult. 4, infimo caeteris majori, albo, fusco picto, in ultimo circiter 15), in interstitiis longitudinaliter tenuiter striati; apertura angusta, longit. totius $\frac{1}{2}$ vix aequans; labrum tenue, vix incrassatum et supra inconspicue sinuatum; columella rectiuscula, laevis, in medio obsolete incisa.

Longit. 7.3 millim., diam. 3; apertura 3.5 millim. longa, 1 lata

At once recognised by its spiral sculpture and fusiformly ovate form. The whitish lira spotted with brown round the middle of the body-whorl, passes up the spire above the suture and is rather thicker than the rest. The specimens differ somewhat in colour, being of a rich brown tint, excepting the upper part of the whorls which is white with a few brown spots.

This variety differs from the type in colour and the stronger lirae. The typical form is uniformly very light brown, although described as white. It usually has five lirae on the penultimate whorl, whereas there are only four in the present variety.

Marginella punctilineata, Smith.

Two specimens differing somewhat from the type in colour. They are dirty whitish with slender brown lines, which are indistinctly dotted as in the normal form. The lower part of the columella is more or less stained with olive brown.

Marginella munda, n. sp.

Pl. ii, fig. 14.

Testa parva, fusiformis, alba, lineis angustis rosaceis subundulatis picta; anfractus 4—5 leviter convexi, sutura obliqua sejuncti; labrum mediocriter incrassatum, album, ad extremitatem posticam roseo maculatum; columella infra callo albo reflexo induta, quadriplicata.

Longit. 7 millim., diam. 3.3.

A small species characterised by its fusiform shape and style of colouration.

Marginella pura, n. sp.

Pl. ii, fig. 18.

Testa *M. metcalfei* similis, sed duplo major, antice minus contracta.

Longit. 6 millim., diam. 3.75.

This species quoted by Mr. Sowerby (Marine Shells S. Africa, p. 20) as the *M. metcalfei* of Angas, differs in size and shape. The Port Jackson shell is only 4 millim. in length, 2.5 in diameter, and is more contracted anteriorly. It is also not so pure white as the present species. Both have four columellar plaits. I cannot separate *M. metcalfei* and *M. ochracea*, both of Angas, and both from New South Wales.

Marginella differens, n. sp.

Pl. ii, fig. 19.

Testa parva, ovata, alba, nitida; spira brevis, ad apicem obtusa; anfractus $3\frac{1}{2}$ celeriter accrescentes; labrum incrassatum, intus denticulatum; columella callo induta, quadriplicata.

Longit. 5 millim., diam. 3.25.

This species was quoted by Mr. Sowerby (Marine Shells S. Africa, p. 20) under the name of *M. bulbosa*, Reeve. It is shorter than that species, has coarser denticulation within the labrum, the columella callus is more defined, and the second plication from the base is more produced to the left over the whorl. The plicae are usually four in number, but an indication of a fifth is sometimes observable. The denticles on the labrum are in the form of short lirae which are visible exteriorly through the transparency of the shell.

Marginella dulcis, n. sp.

Pl. ii, fig. 20.

Testa parva, alba, polita, subpellucida; spira brevissima alba, obtusa; anfractus 4; apertura angusta; labrum mediocriter incrassatum, intus laeve vel liris minutis brevibus 16—17 denticulatum; columella quinque vel sexplicata, plicis duobus anticis aliis majoribus.

Longit. 3.5 millim., diam. 2.2.

A very small subpellucid shell with the labrum smooth or minutely denticulate or lirate within; with a slight notch at the base or anterior end of the aperture, and six columellar folds, of which the two anterior are larger than the rest, which look more like minute denticles than plicae, and in adult specimens may be more or less obscured by callus.

Marginella pseustes, n. sp.

Pl. ii, fig. 21.

Testa minuta, ovata, alba, pellucida, nitida; spira rotundata, haud exserta; anfractus 3, ultimus fere totam testam formans; apertura angusta; labrum extus valde incrassatum, intus laeve, longit. totam testae aequans; columella triplicata, plica antica obliqua, maxima, inferne labro juncta.

Longit. 2 millim., diam. 1.3.

A very small species, ovate, with a rounded apex, a conspicuously thickened lip for so small a shell, and three folds at the anterior end of the columella, of which the basal one is the thickest and unites with the labrum in front.

Purpura texturata, n. sp.

Pl. ii, fig. 15.

Testa parva, ovato-turrita, pallide rufescens, supra porcas spirales rufo punctata; anfractus 6, superiores duo laeves, convexi, mamillaeformes, caeteri supra concavi, in medio nodose angulati, liris minutis spiralibus, incrementique lineis undique cancellati, ultimus porcis quaternis transversis instructus; apertura pallida, rufo fasciata, longit. totius $\frac{1}{2}$ paulo superans; columella alba, parum arcuata, callo tenui induta.

Longit. 22 millim., diam. 13 ; apertura 12 millim. longa, 6 lata.

Remarkable on account of the finely cancellated surface, the nodose angle of the whorls and the style of colouration. The ground colour is very light red, varied with dark brown or red dots or short lines upon the nodose angle of the whorls, and upon the three lower transverse ridges upon the body-whorl. Of these, that nearest the angle is also slightly nodose. The protoconch, consisting of about two whorls, is large, smooth and yellowish. The labrum is thin and very finely crenulated within the margin.

Quite distinct from *P. capensis*, Petit. The fine cancellation is quite different from the sculpture of that species.

***Purpura castanea*, Küster.**

Purpura castanea, Krauss MSS., Küster : Conch. Cab., p. 170, pl. xxviii, figs. 8, 9.

Cominella unifasciata, Sowerby : Journ. Conchol., vol. v, p. 3 ; Marine Shells S. Africa, p. 11, pl. i, fig. 11 ; Appendix, p. 4, var. *concolor*.

Hab.—Cape Agulhas (Küster) ; Port Elizabeth and Natal (Sowb.).

The variety *concolor* of Sowerby's *Cominella unifasciata* is the same as the typical form of *castanea*.

***Nassa poecilosticta*, n. sp.**

Pl. ii, fig. 16.

Testa acuminato-ovata, colore variabilis, aurantia vel fusca, sordide albida fusco lineata et punctata, circa medium anfractus ultimi linea interrupta fusca vel linea alba saepe picta ; anfractus circiter 8 convexiusculi, costis leviter obliquis 12—16 lirisque spiralibus numerosis supra et inter costas continuis instructi, ultimus infra medium liris paucis crassioribus cinctus ; apertura parva ; labrum mediocriter incrassatum, intus liris brevibus 10—11 munitum, saepe pallidum, interdum in medio macula fusca pictum ; canalus anticus saepe fusco tinctus ; columella arcuata, callo tenui tuberculis 3—4 gerente amicta.

Longit. 14 millim., diam. 7 ; apertura intus 4.5 millim. longa, 3 lata.

This species is I believe the *N. coccinea* of A. Adams MSS. as understood by Mr. Sowerby (Marine Shells S. Africa, p. 12). As, however, I have never seen a scarlet specimen, and its colouration is so variable, I venture to propose the name *poecilosticta* for this apparently quite common shell. The manuscript name *coccinea* may therefore be disregarded in future. Mr. Sowerby in the Appendix to the above work (p. 5), has suggested that this species is the same as *N. coccinella*, Lamarck. This, however can scarcely be correct, as that species by general consent is regarded as synonymous with the common *N. incrassata* of British and European coasts.

Some specimens of the present species are uniformly orange, excepting the lip which is white within. Sometimes this variety has a white line round

the middle. Other specimens are uniformly rich brown. Some are dirty whitish, transversely lineated and dotted with brown, often with a more conspicuous interrupted line at the periphery which also passes up the spire above the suture. One specimen has the upper part of the shell pale, dotted with brown, and the lower half of the body-whorl bright orange. The costae are much more oblique in some examples than in others. In *N. fuscolineata*, Smith, from Japan, a closely allied species, the ribs slope in the opposite direction.

***Bullia trifasciata*, n. sp.**

Pl. ii, fig. 17.

Testa oblonga, subturrita, alba, fusco fasciata; anfractus 7, vix convexi, sutura alba callosa obliqua discreti, spiraliter sulcati, sulcis in anfr. penultimo circiter 7, anfr. ultimus infra suturam leviter turgidus, deinde contractus, transversim sulcatus; apertura irregulariter ovata, supra acuminata, intus fuscescens, subfasciata; labrum tenue, arcuatum; columella callo albo crasso reflexo induta.

Longit. 39 millim., diam. 18.

Allied to *B. annulata*, Lamarck, but differently coloured, with a narrower body-whorl, a less sharply turreted spire, and a broader columellar callosity. Of the three brown bands upon the body-whorl, the uppermost upon the swollen edge of the whorl is the darkest.

***Natica napus*, n. sp.**

Pl. ii, fig. 22.

Testa globosa, anguste umbilicata, alba, lineis incrementi tenuibus striisque spiralibus tenuissimis sculpta; spira brevis, obtusa, conoidea; anfractus 6 convexusculi, ultimus infra suturam zona opaca alba ornatus et prope aperturam leviter concave depressus; apertura alba; columella incrassata, reflexa, supra callo crassiusculo labro juncta.

Diam. maj. 31 millim., min. 24; alt. 32.

This species is rather like *N. uber*, Valenciennes, from Peru, but has a different columellar callosity, and the columella itself is not so straight. *N. rapulum*, Reeve, is the same species as *N. uber*.

***Natica decipiens*, n. sp.**

Pl. ii, fig. 23.

Testa parva, globosa, anguste umbilicata, lutescens, lineis undulatis numerosis luteis picta, infra suturam zona alba fusco-maculata, circa basim anfractus ultimi maculis fuscis notata, et infra umbilicum fusco tincta; spira brevis, obtusa; anfractus quatuor, convexi, lineis incrementi striati, ultimus antice oblique descendens; apertura albida; columella callo fusco umbilicum semiobtegente instructa.

Diam. maj. 9 millim., min. 6.5 ; alt. 8.

Allied to *N. queketti*, Sowb., but differently coloured, the body-whorl descends more, and there are differences in the umbilical opening and the columellar callus

Rissoina alfredi, n.sp.

Pl. ii, fig. 24.

Testa elongata, acuminata, alba ; anfractus circiter 10, normales septem fere plani, oblique costati, costis leviter arcuatis, circiter 14, ultimus costis infra undulatis instructus, circa basim inter costas tenuiter liratus ; apertura obliqua, acuminate ovalis ; labrum paulo incrassatum ; columella callo tenui reflexo induta.

Longit. 7 millim., diam. 2.5.

A pure white shell with very oblique ribs and some fine striae around the base of the body-whorl, where the costae are slightly waved.

Rissoa perspecta, n.sp.

Pl. ii, fig. 25.

Testa minuta, elongato-ovata, alba, pellucida, laevis ; spira obtusa, ad apicem rotundata ; anfractus 4, convexiusculi, infra suturam late hyalino-marginati, ultimus elongatus ; apertura parva, pyriformis, $\frac{1}{3}$ longit. totius subaequans ; peristoma continuum, leviter incrassatum, margine externo subpatulo, columellari, subreflexo, appresso.

Longit. 2 millim., diam. 1.

The form and colour are different in *R. conspecta* and the whorls are rounder. The peristome in the present species is thicker and a little patulous, and the pellucid margination below the suture is broader than in *conspecta*.

Rissoa conspecta, n.sp.

Pl. ii, fig. 26.

Testa minuta, ovato-turrita, pallide fuscescens subpellucida, nitida, lineis incrementi tenuibus striata, imperforata ; spira ad apicem rotundata, obtusa ; anfractus 5 convexi, infra suturam hyalino-marginati ; apertura ovato-pyriformis, circiter $\frac{1}{3}$ longit. totius adaequans ; peristoma continuum, margine externo tenui, columellari leviter vel vix reflexo.

Longit. 2 millim., diam. 1.

A very small glossy shell, of a pale brownish colour, without any sculpture, excepting the lines of growth. The peristome is perhaps rather paler than the rest of the whorl.

Eulima distincta, n.sp.

Pl. iii, fig. 1.

Testa parva, breviter subulata, alba, polita, ad apicem haud acuta, varicibus pluribus instructa ; anfractus 8 fere plani, infra suturam leviter obliquam zona angusta pellucida ornati, ultimus ad medium obtuse vel obsolete angulatus ;

apertura piriformis ; labrum leviter incrassatum ; columella arcuata, anguste reflexa.

Longit. 4.5 millim., diam. 1.5.

The slightly thickened labrum and the varices, or former labra, are the peculiar features of this species.

Eulimella nivea, n.sp.

Pl. iii, fig. 2

Testa alba, elongata, subulata, nitens, minute spiraliter substriata et lineis incrementi tenuibus sculpta ; anfractus circiter 12 fere plani, sutura profunda leviter obliqua sejuncti, ultimus ad peripheriam rotundatus ; apertura parva, rotunde subquadrata ; labrum tenue ; columella incrassata, reflexa.

Longit. 10 millim., diam. 2 ; apertura 1.3 longa.

A long, gradually tapering shell, consisting of numerous slowly increasing whorls which are separated by a deep suture. All three examples have lost the protoconch.

Eulimella minor, n.sp.

Pl. iii, fig. 3.

Testa elongata, gracilis, alba, polita, subpellucida ; anfractus 10, duo apicales globosi, sinistralis, transversim siti, caeteri fere plani, sutura obliqua distincta sejuncti, infra suturam zona subopaca angusta cincti, ultimus ad peripheriam rotundatus ; apertura subpiriformis ; labrum simplex ; columella leviter incrassata et reflexa.

Longit. 5 millim., diam. 1 ; apertura .75 longa.

A narrower shell than *E. nivea*, with longer, more rapidly increasing whorls. It is also more pellucid and exhibits an infrasutural zone.

Turbonilla gemmula, n.sp.

Pl. iii, fig. 4

Testa minima, pellucida, nitens, costis numerosis flexuosis obliquis tenuibus instructa ; anfractus normales sex, convexi, sutura profunda obliqua sejuncti, ultimus costis infra medium obsoletis ; apertura parva, irregulariter ovata ; columella rectiuscula, levissime incrassata et reflexa.

Longit. 3.5 millim., diam. 1.

A very small pellucid shell with 17—18 oblique and slightly flexuous ribs, six normal whorls and a globose protoconch, consisting of about two whorls. Apparently there is no spiral sculpture of any kind.

Turbonilla decora, n.sp.

Pl. iii, fig. 5.

Testa elongata, alba ; anfractus normales sex convexi, longitudinaliter oblique tenuiter costati, inter costas spiraliter striati, sutura obliqua profunda sejuncti, ultimus costis infra medium plus minus obsoletis, lineisque spiralibus haud interruptis ; apertura longit. totius circiter $\frac{1}{4}$ aequans ; columella vix incrassata, leviter reflexa, haud plicata.

Longit. 4 millim., diam. 1.

The embryonic sinistral shell forms a globose apex and consists of about two and a half whorls. The ribs on the penultimate whorl are about twenty in number and the spiral striae about ten.

Trifora fuscescens, n. sp.

Pl. iii, fig 6.

Testa parva, gracilis, fuscescens, quadricingulata, cingulo supremo aliis majori, planiusculo, caeteris subaequalibus rotundatis; anfractus circiter 18, fere plani, ultimus cingulis septenis. prope aperturam lineis incrementi sectis et subgranosis cinctus; apertura parva, rotunde quadrata, antice brevissime oblique canaliculata; labrum tenue, postice ad suturam sinuatum, in medio subpatulum, ad marginem leviter crenulatum.

Longit. 11.5 millim., diam. 2.25.

Some of the specimens named *T. cingulatus*, A. Ad., by Mr. Sowerby (Marine Shells of S. Africa, p. 36), belong to the present species. None of them agree with Adams' species, which was described from the Red Sea, and has strong longitudinal sculpture between the spirals.

Trifora fuseomaculata, n. sp.

Pl. iii, fig 7.

Testa elongata, gracilis, alba, fusco irregulariter maculata; anfractus circiter 20 planiusculi, lente accrescentes, quadricingulati, cingulis tuberculatis, duobus medianis aliis majoribus, longitudinaliter sulcati, subcancellati, ultimus infra peripheriam cingulis tribus haud granosis ornatus; apertura rotunde quadrata, antice breviter oblique canaliculata; columella supra arcuata, callo tenui induta.

Longit. 17 millim., diam. 3.5.

Var. (Pl. iii, fig. 8) Testa angustior, minor, cingulis tribus, superioribus aequalibus, distinctius et confertim tuberculatis.

Longit. 15 millim., diam. 3

The typical form is more distinctly blotched with brown than the variety.

Trifora convexa, n. sp.

Pl. iii, fig. 9.

Testa parva, fusca, ad apicem albida; anfractus 10 convexi, supremi duo pallidi, laeves, caeteri tricingulati, cingulis granosis, duobus inferioribus magis conspicuis, sutura filiformi sejuncti, ultimus ad peripheriam rotundatus, cingulis sex instructus; labrum subpatulum; columella callo crasso pellucido induta, supra incurva.

Longit. 5.5 millim., diam. fere 2.

The suture is marked by the lira which encircles the periphery of the body-whorl, and winds up the spire at, but above the actual suture.

Ethalia africana, n. sp.

Pl. iii, figs. 10, 11.

Testa minuta, depressa, orbicularis, pellucido-alba, nitens, supra et infra plus minusve spiraliter microscopice striata; spira depressa; anfractus tres, celeriter accrescentes, ultimus callo conspicuo supra instructus, et infra callo crasso umbilicale munitus, ad peripheriam rotundatus; apertura fere circularis, marginibus callo columellari crasso junctis.

Diam. maj. 1.75 millim.; alt. fere 1.

Remarkable on account of the callosity upon the upper surface of the body-whorl. Very like *E. perspicua* and *E. lucida*, A. Ad., from China and Japan, but with more basal callus, besides the callosity upon the upper surface. It is the *Teinostoma lucidum* of Sowerby's "Marine Shells of S. Africa," p. 13.

Cynisea forticostata, n. sp.

Pl. iii, figs. 12, 13.

Testa *C. granulosa* similis, sed costis spiralibus crassioribus et minus numerosis instructa.

Diam. maj. 7.5 millim., alt. 6.

This species is of the same form as *C. granulosa*, Dunker (= *C. granatum*, A. Ad.), but is distinguished by its fewer and stronger spiral ridges. They are seven in number on the body-whorl and prettily granular in well-preserved specimens, the one bordering the deep umbilicus being especially strong. In Dunker's species the ribs number 4—5 on the upper surface of the last whorl and 6—7 below. The colour of this species is white, sometimes dotted with pink above upon the ridges.

Retusa truncatula (Bruguière).

Utriculus truncatulus, Bruguière: Jeffreys, Brit. Conch., vol. iv, p. 421; Pilsbry, Man. Conch., vol. xv, p. 205, pl. xxi, figs. 11, 12, pl. xxiii, figs. 62—64.

Hab.—N. Europe, Mediterranean, Adriatic, Canaries.

I believe this species has been erroneously quoted by Mr. Sowerby as *Cylichna umbilicata*, Mont. (Marine Shells S. Africa, p. 52).

Ampullarina africana, n. sp.

Pl. iii, fig 14.

Testa minima, irregulariter ovata, perforata, pallide fuscescens; anfractus 5, convexi, laeves, sutura profunda sejuncti; apertura concolor, piriformis; peristoma continuum, margine columellari albo, reflexo, externo intus prope insertionem incrassato.

Longit. 4 millim., diam. 3.

A small species without any striking characters. The surface is smooth, excepting very faint lines of growth. The whorls are very convex, and the suture almost channelled. The upper part of the whorls is more opaque than the lower portion, the shell being thickened within. This is seen within the aperture at the upper part.

Cultellus decipiens, n.sp.

Cultellus pellucidus, Sowerby (non Pennant): Marine Shells S. Africa,
p. 54.

Testa *C. pellucido* similis, sed major, latere antico longiore.

This species is very like the well-known *C. pellucidus*, Pennant, of the British coast, but attains large dimensions, the largest specimen examined being 53 millim. in length. The position of the beaks is proportionately further back, so that the anterior portion of the shell is rather longer. The strengthening rib within the valves, which is in front of the hinge teeth, is longer, straighter and almost parallel with the dorsal edge.

Semele capensis, n.sp.

Pl. iii, figs 15, 16.

Testa parva, antice latior, postice acute rotundata, fere aequilateralis, compressa, albida, radiatim tenuissime striata, lineisque incrementi distantibus lamelliformibus ornata; umbones acuti, laeves; sinus pallii profundus, rotunde acuminatus; cicatrix antica elongata, postica latior.

Longit. 11 millim., alt. 8, diam. 3.5

This species may attain larger dimensions than those here given. Its sculpture (Fig. 16) recalls that of certain *Tellinae* such as *T. tessellata*, Desh., *T. carnicolor*, Hanley, etc.

Theora ovalis, n. sp.

Pl. iii, fig. 17.

Testa parva, tenuissima, ovalis, alba, fere aequilateralis, antice subbrevior, postice vix angustior; valvae nitidae, incrementi lineis tenuissimis striatae, mediocriter convexae; um' ones parvi, acuti, leviter prominentes; dens cardinalis unicus in utraque valva, et fossa ligamenti margine incrassato pone limitata.

Longit. 9.5 millim., alt. 7, diam. 3.5.

There are only the faintest indications of lateral teeth on the hinder margin in each valve, and I cannot trace any pallial sinus.

Tellina regularis, n. sp.

Pl. iii, fig. 18.

Testa parva, inaequilateralis, tenuis, subpellucido-albida, vel dilutissime fuscescens, concentrice tenuissime striata; margo dorsi anticus rectiusculus, leviter descendens, posticus brevior, magis declivis; latus anterie acute rotundatum, posterius subrostratum; dentes cardinales valvae dextrae duo divergentes; dens lateralis anticus brevis, prope umbones situs, posticus longior, tenuior; dentes cardinales valvae sinistrae duo, laterales nulli; sinus pallii profundissimus.

Longit. 14 millim., alt. 10, diam. 4.5

Some specimens are marked with radiating, broken-up, hair-like pellucid lines.

Macoma litoralis, Krauss.

This is the *Tellina* (*Macoma*) *calcareo* of Sowerby's Marine Shells, S. Afr., p. 57, and is separable from that northern species by its rather more equilateral form and by the pallial line which generally extends across the valves, reaching practically from scar to scar. The shell is sometimes white and sometimes reddish, and attains larger dimensions than the specimen described by Krauss. The largest example examined is 35 millim. in length.

Lucina despecta, n. sp.

Lucina columbella, Sowerby (non Lamarck): Marine Shells S. Africa, p. 61.

Testa *L. columbellae* paulo similis, sed tenuior, liris concentricis magis confertis, lunula infra umbones haud excavata, sulco obliquo postico minus profundo, umbonibus laevibus, haud concentrice liris, marginibus valvarum intus laevibus, haud denticulatis.

Longit. 23 millim., diam. 16, alt. 24

Hab.—Port Elizabeth (Sowerby); Port Alfred (Turton).

Some specimens are white beneath the thin pale deciduous periostracum, others are rose tinted externally and of a deeper shade within. The hinge is more delicate than in *L. columbella*, especially the lateral teeth. It is remarkable that so distinct a shell should have been confused with that species.

Lucina valida, n.sp.

Pl. iii, fig. 19.

Testa parva, solida alba, subpiriformis, inaequilateralis, confertim concentricis lirata et radiatim striata, umbones prominentes, acuminati, incurvati; valvae crassae, sulcis 2—3 remotis concentricis sculptae intus ad marginem ventralem minute crenulatae.

Longit. 7 millim., alt. 7, diam. 4.

Belonging to the same group as *L. pecten*, Lamk., but smaller, and more solid. The two or three grooves at intervals are peculiar, and apparently indicate periods of arrested growth. The radiating striae cut across the concentric lirae and give them a somewhat granose appearance. The lirae are closely packed, being merely separated from one another by striae-like grooves.

Loripes clausus, Philippi.

Lucina clausa, Philippi: Abbild., vol. iii, p. 101, pl. ii, fig. 2.

Loripes lacteus, Linn : Sowerby, Marine Shells S. Africa, p. 61.

This South African shell is quite distinct from the European *L. lacteus*, being rather flatter, much larger, having a deeply excavated lunule, and differing in other respects as pointed out by Philippi.

Lepton fortidentatus, n.sp.

Pl. iii, fig. 20.

Testa parva, triangulariter ovata, aequilateralis, mediocriter convexa, alba, undique conspicue punctata, lineisque incrementi hic illic striata; margo dorsi utrinque declivis, vix curvatus, ventralis late arcuatus; latera acute rotundata; dens lateralis crassus prope umbonem in utraque valva, posticus gracilior.

Longit. 5.5 millim., alt. 4, diam. 2.5.

Remarkable on account of the pitted surface, very like that of a finely punctate thimble.

Tellimya similis, n.sp.

Pl. iii, fig. 21.

Testa parva, leviter compressa, oblonga, utrinque rotundata, inferne rectiuscula vel in medio incurva, leviter inaequilateralis, nitida, lineis incrementi striata; margo dorsi utrinque declivis; latus anticum rotundatum, posticum paulo angustius; dentes duo divergentes valvae sinistrae subvalidi et margo utrinque umbonem valvae dextrae prominens; pagina interna laevis, nitida.

Longit. 6.5 millim., alt. 4.5, diam. 2.5.

Allied to *Tellimya producta*, Smith, from St. Helena, but less convex, longer in proportion to the height, and with longer, stouter, and more divergent teeth in the left valve.

Cardita (?) minima, n.sp.

Pl. iii, fig. 22.

Testa oblique subpiriformis, minima, mediocriter compressa, laevis, incrementi lineis tenuibus striata, pellucido-alba, vel pallide rosea, lineis opacis, albis, plerumque interruptis et guttatis, radiatim picta, radiis duobus, rufescentibus aliquando ornata; umbones acuminati, antice curvati; margo dorsi posticus elongatus, curvatus, anticus brevior, concavus; lunula excavata, margine distincto circumdata; cardo validus, dente unico in valva sinistra, duobus in valva dextra, postico valde prominente, margine postico valvae sinistrae et antico valvae dextrae sulco instructo; pagina interna albida, vel rosacea, radiata, margine ventrali leviter dentato.

Longit. 3 millim., alt. 3, diam. 2.

Provisionally placed in the genus *Cardita* until more specimens are available, so that the hinge-characters can be more thoroughly examined. Allied to *Cardita elata*, Sowerby, but not costate like that species, and different in colour and form.

Carditella laticosta, n.sp.

Pl. iii, fig. 23.

Testa parva, oblonga, compressa, valde inaequilateralis, alba, interdum rufo maculata, costis radiantibus latis curvatis 12 instructa, lineisque incrementi striata; margo dorsi anticus brevis, valde declivis, posticus longior, vix

descendens, ventrali fere parallelus ; latus anticum anguste rotundatum, posticum latius, oblique curvatum ; umbones parvi, acuti ; lunula angusta, excavata ; pagina interna alba, radiatim fortiter sulcata, supra marginem dorsalem rufo tincta.

Longit. 7.5 millim., alt. 4.5, diam. 3.

The hinge is normal, consisting of a single cardinal tooth in the right valve and two in the left, with two laterals in each valve, whereof the anterior in the right and the posterior in the left are a little stouter than the others.

Hochstetteria velaini, n.sp.

Pl. iii, fig. 24.

Testa parva, obliqua, tenuis, alba, lineis pellucidis in medio radiata, inaequilateralis, nitida, convexa, incrementi lineis striata, supra latus posticum lira tenui, ab umbone usque ad marginem producta, instructa ; latus anticum obliquum, parum arcuatum, posticum leviter incurvatum ; umbones prominentes, incurvati ; linea cardinis crassa, fere recta, transversim striata, in medio fossa ligamenti triangulari sculpta ; pagina interna marginibus ventrali et postico crenulatis.

Longit. 3.5 millim., alt. 4, diam. 2.5.

The slender lira on the posterior side runs down a shallow depression in the valves, which causes the faint sinuation in the outline. Named after the author of the genus.

Hochstetteria limoides, n.sp.

Pl. iii, fig. 25.

Testa minima, ovato-subpiriformis, alba, fere aequilateralis, radiatim tenuissime costulata ; latus anticum oblique truncatum, leviter excavatum, posticum curvatum ; umbones prominentes ; linea cardinis crassa, transversim striata, in medio fossa ligamenti angusta obliqua interrupta, ad extremitatem posticam infra dentibus lateralibus duobus terculiformibus instructa ; pagina interna leviter radiatim sulcata, ad marginem tenuissime denticulata.

Longit. 2.6 millim., alt. 3.3, diam. 2.

As regards form and the radiating costae, this species has the appearance externally of a minute *Lima*.

Modiola tenerrima, n.sp.

Pl. iii, fig. 26.

Testa parva, oblonga, tenuis, antice angustata, postice paulo dilatata, pallida, purpureo tincta, maculata et lineata, lineis incrementi tenuissimis sculpta, antice infra umbones sulcis 2—3 radiantibus ornata ; margo dorsi rectus, pulcherrime minute denticulatus, ventralis levissime incurvatus ; pagina interna margaritacea, lineis rufo-purpureis subundulatis variegata.

Longit. 13 millim., alt. 7, diam. 4.5.

Quite distinct from any of the other S African mussels. The most remarkable feature is the prettily dentate dorsal margin of the valves, the crenulation extending on both sides the umbones. The two or three radiating sulci at the anterior end are visible within the valves also.

***Limopsis pumilio*, n.sp.**

Pl. iii, figs. 27, 28.

Testa minima, trigona, crassa, alba vel rufo maculata, laevis; margo dorsi utrinque valde declivis, rectiusculus, ventralis curvatus; umbones peculiares, quasi truncati; cardo crassissimus, dentibus anticis tribus, posticis quaternis minutis; sulcus ligamenti profundus; pagina interna radiatim striata; cicatrices profundae.

Longit. 3 millim., alt. 3.25, diam. 2.

Remarkable for the strength of the hinge and the peculiar umbones which have the appearance of being truncate, but, when the tip is closely examined, appear to have a circular cap.

***Lima perfecta*, n.sp.**

Pl. iii, fig. 29.

Testa parva, convexa, alba, radiatim costata et sulcata, costis granosis, sulcis aequantibus, clausa, antice oblique truncata, profunde excavata, postice et inferne regulariter curvata; valvae crassiusculae; area dorsalis parva, excavata, fossa ligamentali obliqua triangulari sculpta; pagina interna radiatim sulcata, ad marginem late dentata.

Longit. 12 millim., alt. 15, diam. 10.

The costae are about eighteen in number, exclusive of a few finer ones near the posterior margin, and those in the anterior excavation which are also finer than those on the central part of the valves.

EXPLANATION OF PLATES.

Plate II.

- | | |
|--------------------------------------------------|-----------------------------------------------|
| Fig. 1. <i>Drillia thetis</i> , n. sp. | Fig. 14. <i>Marginella munda</i> , n. sp. |
| Fig. 2. <i>Drillia subcontracta</i> , n. sp. | Fig. 15. <i>Purpura texturata</i> , n. sp. |
| Fig. 3. <i>Drillia albonodulosa</i> , n. sp. | Fig. 16. <i>Nassa pœciliosticta</i> , n. sp. |
| Fig. 4. <i>Drillia practermussa</i> , n. sp. | Fig. 17. <i>Bullia trifasciata</i> , n. sp. |
| Fig. 5. <i>Drillia nivosa</i> , n. sp. | Fig. 18. <i>Marginella pura</i> , n. sp. |
| Fig. 6. <i>Clathurella crassilirata</i> , n. sp. | Fig. 19. <i>Marginella differens</i> , n. sp. |
| Fig. 7. <i>Glyphostoma siren</i> , n. sp. | Fig. 20. <i>Marginella dulcis</i> , n. sp. |
| Fig. 8. <i>Mangilia alfredi</i> , n. sp. | Fig. 21. <i>Marginella pœustes</i> , n. sp. |
| Fig. 9. <i>Ancilla albozonata</i> , n. sp. | Fig. 22. <i>Natica naps</i> , n. sp. |
| Fig. 10. <i>Ancilla reevei</i> , n. sp. | Fig. 23. <i>Natica decipiens</i> , n. sp. |
| Fig. 11. <i>Fusus cingulatus</i> , n. sp. | Fig. 24. <i>Rissoina alfredi</i> , n. sp. |
| Fig. 12. <i>Terebra suspensa</i> , n. sp. | Fig. 25. <i>Rissoa perspecta</i> , n. sp. |
| Fig. 13. <i>Mitromorpha volva</i> , Sowb., var. | Fig. 26. <i>Rissoa conspecta</i> , n. sp. |

Plate III.

- | | |
|----------------------------------------------------|-------------------------------------------------------------|
| Fig. 1. <i>Eulima distincta</i> , n. sp. | Fig. 16. <i>Semele capensis</i> , sculpture
[magnified.] |
| Fig. 2. <i>Eulimella nivea</i> , n. sp. | Fig. 17. <i>Theora ovalis</i> , n. sp. |
| Fig. 3. <i>Eulimella minor</i> , n. sp. | Fig. 18. <i>Tellina regularis</i> , n. sp. |
| Fig. 4. <i>Turbonilla gemmula</i> , n. sp. | Fig. 19. <i>Lucina valida</i> , n. sp. |
| Fig. 5. <i>Turbonilla decora</i> , n. sp. | Fig. 20. <i>Lepton fortidentatus</i> , n. sp. |
| Fig. 6. <i>Trifora fuscescens</i> , n. sp. | Fig. 21. <i>Tellinya similis</i> , n. sp. |
| Fig. 7. <i>Trifora fuscomaculata</i> , n. sp. | Fig. 22. <i>Cardita minima</i> , n. sp. |
| Fig. 8. <i>Trifora fuscomaculata</i> , var. | Fig. 23. <i>Carditella laticostata</i> , n. sp. |
| Fig. 9. <i>Trifora convexa</i> , n. sp. | Fig. 24. <i>Hochstetteria velaini</i> , n. sp. |
| Figs. 10, 11. <i>Ethalia africana</i> , n. sp. | Fig. 25. <i>Hochstetteria limoides</i> , n. sp. |
| Figs. 12, 13. <i>Cynisca forticostata</i> , n. sp. | Fig. 26. <i>Modiola tenerrima</i> , n. sp. |
| Fig. 14. <i>Ampullarina africana</i> , n. sp. | Figs. 27, 28. <i>Limopsis pumilio</i> , n. sp. |
| Fig. 15. <i>Semele capensis</i> , n. sp. | Fig. 29. <i>Lima perfecta</i> , n. sp. |

NOTE ON CORILLA ERRONELLA, NEV., MS.

By G. K. GUDE, F.Z.S.

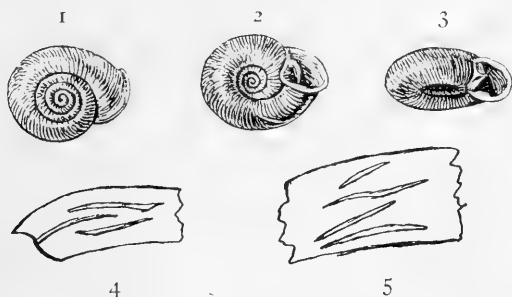
THE collection of the late Hugh Nevill, which came under the hammer at Stevens' Sale Rooms on the 10th of May last, contained a number of shells of *Corilla*, which, at first, I was inclined to regard as a new species.

The lot was acquired by Mr. H. B. Preston, who kindly placed several of the specimens at my disposal and upon closer examination the shell in question appears to be identical with one which Colonel Beddome received years ago with the manuscript name *Helix erronea*, Nev., Ceylon, and which I figured and named provisionally *Corilla erronea*, var. *erronella* (Science Gossip, (N.S.) III, (1896) p. 127, fig. 16.) The large amount of material now at command enables one to form a more accurate estimate as to its rank, and in view of the constant and considerable differences both in the ordinary shell characters and in the armature, I have no hesitation in according it specific rank. Unfortunately no record of the precise habitat has been found, but there can be no doubt that the shells were collected in Ceylon.

I am now in a position correctly to define the species and to illustrate the armature more fully from specimens opened for that purpose.

Corilla erronea, Nev., MS.

Shell discoid, elliptic, widely umbilicated, dark corneous, or chestnut; a little shining above, polished below, finely and regularly ribbed; spire plane, suture



impressed; whorls $4\frac{1}{4}$ to $4\frac{1}{2}$, slightly flattened above, rounded at the periphery, tumid below, increasing slowly at first, the last suddenly widening and dilated at the aperture, deflected in front, constricted behind the peristome; nepionic whorls ($1\frac{1}{2}$) almost smooth. Aperture nearly horizontal, ovate-obcordate, margins distant, united by a sinuous fold on the parietal wall. Peristome fuscous or pinkish, thickened and well reflexed; upper margin very shortly ascending at first, then descending, with a more or less strong inward inflection; outer margin curved, lower margin with a strong oblong tubercular tooth. Parietal armature consisting of three elongated curved folds: the

first (upper) shortest; the second longest, united to the sinuous fold at the aperture, free posteriorly; the third—near the lower suture—slowly ascending posteriorly. Palatal folds four: the first (upper) shortest, slightly curved, descending posteriorly; the second longest, the anterior half ascending, the posterior half almost horizontal; the third, a little longer than the first, scarcely curved, descending very obliquely posteriorly; the fourth nearly as long as the second, curved parallel with, and near to, the lower suture, and reaching nearly to the aperture.

Major diam. 16—18, minor 12.5; alt. 5.5 millim.

Hab.—Ceylon. Type in Col. Beddome's collection.

From *Corilla erronea*, Alb., its nearest ally, *C. erronea* differs in its more regular contour and its smaller size. The riblets are more pronounced and more regular and do not anastomose, while the incised spiral lines on the lower surface, so conspicuous a feature in *C. erronea* and many of its allies are usually lacking. In the armature there are considerable differences: the second parietal fold, which in *C. erronea* is united posteriorly to the first, is here quite free posteriorly. The palatal folds are generally shorter and much nearer the peristome, being all visible from the aperture; while the third fold, which in *C. erronea* is very short and nearly horizontal, is here longer and obliquely descending. Figs. 1—3 show the shell in three different positions, while a diagrammatic view of the armature is given in figs. 4 and 5, the former showing the parietal folds and the latter exhibiting the palatal folds as they appear within on the outer wall. A number of immature shells show the usual five palatal folds, the first four very oblique, the fifth small and horizontal, but no parietal barriers, which do not appear to be formed until the shell reaches maturity.

DESCRIPTION OF A NEW SPECIES OF *ARIUNCULUS* FROM ALGERIA.

BY WALTER E. COLLINGE, M. Sc.,
The University, Birmingham.

SOME short time ago I received from Mr. P. Pallary a number of live specimens of Algerian slugs, amongst which was the specimen forming the subject of this paper. Unfortunately there was only a single specimen, but Mr. Pallary has very kindly promised to try and procure more, in order that a more detailed account may be given of the generative organs and a coloured figure of the animal.

I have much pleasure in associating the name of Mr. Pallary with this interesting species.

Ariunculus pallaryi, n. sp.

Animal (alive) reddish-brown, darker medio-dorsally, with three faint, ill-defined, blackish lines running from the posterior border of the mantle to the tail, where they converge; mantle smooth, light brown, with faint reddish tinge, which latter quickly disappears on placing in alcohol; head and tentacles yellowish-brown, darker dorsally. Rugae elongated, flat, clearly marked by definite sulci. Caudal gland well defined, but partially hidden by the margin of the foot. Respiratory orifice situated towards the anterior end of the mantle. Generative orifice about half way between the right upper tentacle and the respiratory orifice. Peripodial groove sharply marked. Foot-fringe and foot-sole lighter in colour, latter divided into median and lateral planes.

Length (alive) 72 millim.; (in alcohol) 50.

Shell a thick, somewhat pyriform calcareous plate.

Maj. diam. 6.2 millim., min. 4.

Hab.—Echmühl, Oran, Algeria (P. Pallary).

This, the largest known species of *Ariunculus*, at first sight gives one the impression of an elongated form of *Arion subfuscus*, Drap. Anatomically it is very distinct from any of the described species.

The vestibule of the generative organs leads into an elongated vagina, which suddenly widens out to form a large globular sac, with a somewhat complicated internal structure. From the posterior and outer border of this sac the receptacular duct is given off, while ventrally and slightly anteriorly is a large retractor muscle. On the same side at the anterior end is the free-oviduct, and at the opposite side and posteriorly the sperm-sac arises.

The remaining organs have not yet been examined in any detail.

SOME RECENT SLUG PAPERS.

By. D. F. HEYNEMANN.

Frankfort on Main.

Dr. Simroth has recently sent me two papers on Slugs, a group of molluscs upon which he has been working for many years with inexhaustible zeal and success.

The first is on the *Philomyrtilae* and *Arionidae* (Sitz. ber. naturf. Gesell. Leipzig, Jan. 14th, 1902) of which, as well as the second, the reprint is just coming to hand. A more detailed treatise of the two families is promised, which will be published in Tokio, in the meantime a preliminary account is given, which draws into the range of discussion, in the course of various divisions devoted to anatomy, such genera as *Oopelta*, *Anatlenus*, etc. Of the genus *Philomycus* the following are treated of: *P. striatus*, v. Hass., from Java, *P. balius*, n.sp., and *P. tonkinensis*, n.sp., both from Tonkin, *P. taiwanensis*, n.sp., from Formosa, *P. doederleini*, n.sp., from the Island of Liu-Kiu, *P. bilineatus*?, Bens., from the Japanese Islands, *P. melachlorus*, n.sp., from Tsu-shima, an island between Japan and Korea, and *P. viperinus*, n.sp. from Japan.

The second paper has the title "Ueber die von Herrn Dr. Neumann in Abessinien gesammelten aulacopiden Nacktschnecken (Zool. Jahrb. (Abth. f. Syst.), 1903, Bd. 19). Of the three families discovered, viz., the *Vaginulidae*, *Limacidae*, and *Urocythidae*, the concurrence of which in the Abessinian highlands presents a most remarkable circumstance, the *Vaginulidae* are reserved for a later occasion and only the genera *Agriolimax*, *Atoxon*, and *Spirotoxon* are dealt with. The following are described as new: *Agriolimax afer*, *uataherensis*, *garbullanus*, *gojanus*, *glanulosus*, *koschanus*, *kintanus*, *concrementosus*, *kaffianus*, *abessinicus*, *deckeni*, *gimirranus*, *fuscus*, and *limacoides*, the latter as the link between *Agriolimax*, Mörch, and *Lehmannia*, Heyn.

After Dr. Simroth's recent description of a similarly large number of species of this genus from the Caucasus (Die Nacktschnecken des Russischen Reiches, 1901), where he locates the centre of origin of the genus, it certainly surprises me to see described such a variety of species from a very distant district, without an example of any of those of the Palaearctic region. Dr. Simroth, however, does not fail to give an explanation, he considers the difficulty to be very simply solved by the Pendulum theory, which has been defended and perfected by him. The theory of the pole of oscillation between Sumatra in the east, and Equador in the west; the only points in the world which have retained their equatorial position from early times, and from which the remains of ancient species existing then in refuge, could spread according to the temporary changes in the formation of dry land along the equator again, and from there northwards and southwards, according to Dr. Simroth.

In the *Urocyclidae* there are described from the Neumann collection, *Atoxon erlangeri*, *Spirotoxon neumanni*, and from the former collection of Stuhlmann *S. stuhlmanni*.

Finally the opportunity is taken to set up a new genus *Varania*, with a single new species *V. loennbergi*, found in the stomach of a species of *Varanus* in Cameroon by Mr Loennberg of Upsala.

There were also found at the same time some 60 or 70 *Veronicellas*.

Simroth assumes that Slugs from the Cameroons have up to the present been unknown, but he overlooks the fact that he himself has reviewed a work by Adolf d'Ailly (*Contributions à la connaissance des Mollusques terrestres et d'eau douce de Kaméroun*), in which various slugs are mentioned, e.g. *Aspidelus chaperi*, Morelet, *Vaginula pleuroprocta*, v. Martens, and *Urocyclus buchholzi*, v. Martens, and that he declared the *Urocyclus* to be very like his *Dendrolimax continentalis*.

NOTES.

Note on *Testacella haliotideae*, Drap. My garden at Aldenham abounds in this curious slug. In digging over last year's celery bed, the gardeners turned it up by dozens, and I observed that it was numerous in a series of broad bands stretching across the bed, while in other parts of the area it was absent. These broad bands represented the former position of the celery trenches: doubtless the manure attracted the worms, and the worms the *Testacella*. Perhaps it was for a similar reason that we found it abundant on an old marrow bed.

As a rule, it was living at a depth of about 12 inches. On four separate occasions I found it on the surface; twice under large flint stones, once under a heavy elm log, the latter being in a part of the garden never under cultivation. On the fourth occasion I noticed a large specimen crawling across a wide gravel walk at eleven o'clock on a fine bright morning. This seemed to me remarkable, for I have never before observed the creature taking a voluntary walk in the upper world, and there was no indication that my specimen had been the prey of a bird, nor had there been any disturbance of the soil anywhere near.

Since the above was written, I have satisfied myself by repeated observation, that the *Testacella* habitually crawls about on the surface of the ground.

A. H. COOKE.

Note on *Parmacella deshayesii*, Moq.-Tand. In February last Mr. P. Pallary sent me a number of living slugs from Echmühl, Oran, Algiers, amongst which were some examples of *Parmacella deshayesii*, Moq.-Tand. Some of these I turned out in the garden beneath a mass of cabbage and lettuce leaves. On March 26th, I noticed they were pairing, and a few days later there were two or three groups of eggs averaging a dozen each. The eggs of this mollusc are oval, and when deposited have a pearly lustre, which, however, quickly disappears leaving them a dead opaque white. The maximum diameter is 6 millim., and the minimum 4. On April 27th, about a third had hatched out and I was hoping I should be able to rear them, but turning over the lettuce leaves on May, 7th, I found all had been killed by the night frosts, as well as some adults which arrived on April 21st.

WALTER F. COLLINGE.

CURRENT LITERATURE.

Hoyle, William E.—Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U.S. Fish Commission Steamer "Albatross," from August, 1889, to March, 1900. Commander Jefferson T. Moser, U.S.N., Commanding. Report on the Cephalopoda. Bull. Mus. Comp. Zoöl. Camb., Mass., 1904, vol. xliii, pp. 1—71, pls. 1—12, text figs. A—G.

The collection here described by Dr. Hoyle consists of thirty species, distributed in nineteen genera, of which the following are new: *Stauroteuthis hippocrepium*, *Froekenia clara*, gen. et sp. nov., *Tremoctopus scalensus*, *Polypus oculifer*, *Cirrobrachium filiferum*, gen. et sp. nov., *Loligo diomedecae*, *Rhynchoteuthis chuni*, *Mastigoteuthis dentata*; in addition to these, there are a few forms to which the author has not found it possible to affix names.

A List of Stations, with the species obtained at each is given, and an Appendix treats of the Luminous Organs of *Pterygioteuthis giardi* and *Abraliopsis hoylei*.

The paper is beautifully illustrated. In the preparation of certain plates the author remarks that he has "utilised a number of water-colour drawings made on the expedition by Mr. Agassiz and Mr. Magnus Westergren whilst the animals were still fresh and the colours of life retained. It would be well if this practice had been followed on other expeditions, as the appearance of Cephalopoda changes very markedly after preservation in alcohol."

Melvill, J. Cosmo.—Descriptions of twenty-three species of Gastropoda from the Persian Gulf, etc. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 51—60, pl. v.

Melvill, J. Cosmo.—On *Berthais*, a proposed new genus of Marine Gastropoda from the Gulf of Oman. Ibid., pp. 61—63, figs. 1, 11.

The type of this genus was described some short time back as *Scala (Constantia) intertexta*, Melv. & Stand. Since then Mr. Melvill has submitted the shell to Dr. Dall, who regards it as belonging to a new genus. Its nearest ally, Mr. Melvill regards as *Aclis*, while *Constantia* is not far removed.

As has already been suggested by Mr. Edgar A. Smith, *Onoba cgregia*, A. Ad., also belongs to the same genus.

Melvill, J. Cosmo.—Note upon *Oliva gibbosa*, Born, and its limits of variation. Ibid., pp. 64, 65.

Burne, R. H.—Notes on the Nervous System of the Pelecypoda. Ibid., pp. 41—47, figs. i—iii.

Collinge, Walter E.—Some Remarks on the genera *Damayantia*, Issel., *Collingea*, Simr., and *Isselentia*, Clige. Ibid., pp. 9—12.

Collinge, Walter E.—Contributions to the Terrestrial Zoology of the Faroes. By Nelson Annandale. Land and Freshwater Mollusca. Proc. Roy. Physical Soc. Edinb., 1904, vol. xv, pp. 153, 154.

Simroth, Heinrich.—Über *Ostracolethe* und einige Folgerungen für das System der Gastropoden. Zeit. f. wiss. Zool., 1904, Bd. lxxvi, pp. 612—672, T. xxxii.

Dr. Simroth here gives a more detailed account of *Ostracolethe fruhstorferi* described in 1901, and which he regards as synonymous with *Myotesta*, Clige.

Simroth, H.—Über Philomyciden und Arioniden. SB. Naturf. Gesell. Leipzig, 1901 pp. 32—45.

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VOL. XI.

ON SOME NEW SPECIES OF MELANIA AND JULLIENIA
FROM YUNNAN AND JAVA.

BY HUGH FULTON.

(Plate iv.)

Melania aeruginosa, n. sp.

Pl. iv, fig. 1.

SHELL solid, dark rusty brown, smooth, surface somewhat shining, sculptured with a few distant oblique and rather obtuse folds, prominently channelled at the suture, the margin of which, especially on the last whorl, is rather prominent; apex eroded, $5\frac{1}{2}$ whorls remaining, almost flat, aperture sub ovate, bluish-grey within; peristome thin, sinuous above.

Maj. diam. $13\frac{1}{2}$; alt. 33 millim.

Hab.—Soekaboemi, Java.

Strongly characterised by its canaliculate suture.

Melania dulcis, n. sp.

Pl. iv, fig. 2.

Shell rather thin, dark brown, elegantly ornamented by spiral rows of small granules, six on the last whorl, with two other less granular striae below. Apex slightly eroded, $7\frac{1}{2}$ whorls remaining, slightly convex; aperture broadly ovate, light bluish-grey within, the interstices between the external granules showing through as darker-coloured squarish spots; peristome very thin.

Maj. diam. 13; alt. 44 millim.

Hab.—Yunnan-fu Lake, Yunnan.

A distinct and very elegant species.

Melania fortitudinis, n. sp.

Pl. iv, fig. 3.

Very solid, yellowish-olive colour, spirally striated, seven or eight spiral costae on the last whorl, crossed by oblique folds which are prominently noded

above, margined at the suture by a somewhat depressed nodulous channel. Apex somewhat eroded, 6 whorls remaining, moderately convex, aperture narrowly ovate, bluish-grey within, peristome acute

Maj. diam. $12\frac{1}{2}$; alt. 37 millim.

Hab.—Soekaboemi, Java.

This species has some superficial resemblance to the Ceylon form *M. broti*, Dohrn, but that has coarser sculpture and the whorls increase more rapidly.

***Melania lauta*, n. sp.**

Pl. iv, fig. 4.

Shell thin, dark brown, ornamented by spiral rows of granules. Apex eroded, 4 whorls remaining, slightly convex; aperture ovate, bluish-grey within; peristome rather thin.

Maj. diam. 12; alt. 28 millim.

Hab.—Yunnan-fu Lake, Yunnan.

In general character very like *dulcis*, but much shorter and much more deeply depressed at the basal area of the columella

***Jullienia carinata*, n. sp.**

Pl. iv, fig. 5.

Shell subglobular, whitish, covered by a light yellowish-brown periostracum, middle whorls somewhat darker than apex and body-whorl; slightly rimate or excavated at the umbilical area; whorls $4\frac{1}{2}$, rapidly increasing, with very fine arcuate lines of growth, otherwise smooth, with two keels, a rather thick and prominent one at the periphery and a less developed one situated below the suture of the latter part of the last whorl; aperture sub-oval, very oblique; peristome continuous, rather thick, whitish and shining.

Maj. diam. $5\frac{1}{2}$; alt. 5 millim.

Hab.—Yunnan-fu Lake, Yunnan.

The nearest form known to me is *Jullienia costata*, Poir., but that species is easily separated by its less globular form and spiral costae.

ON A COLLECTION OF LAND SHELLS FROM GEBI ISLAND, MOLUCCAS, WITH DESCRIPTIONS OF NEW SPECIES.

BY HUGH FULTON.

(Plate iv.)

THE species noted in this paper were collected by Mr. John Waterstradt on the island of Gebi, which is situated about midway between Waigiu and Halmahera Islands.

1.—*Xesta aulica*, Pfr.

2.—*Planispira kurri*, Pfr.

Numerous varieties occur of this species and the variation in size is remarkable; the following are the dimensions of two extreme forms:—

A. Maj. diam. (including peristome) 21; alt. 10 millim.

B. " " " 30; " 13 "

3.—*Papuina unicolor*, Pfr.

Helix unicolor, Pfr.: Proc. Zool. Soc, 1845, p. 64.

Ampelita unicolor, Pils.: Tryon's Man. Moll., vol. vi, p. 37, pl. 5, figs. 74—76.

An interesting discovery, as the habitat of this species was hitherto unknown, and owing to its similarity in form to some species of *Ampelita*, it had been thought by some to be from Madagascar.

4 —*Papuina fallax*, n. sp.

Pl. iv, figs. 6, 7.

Shell somewhat depressed, narrowly perforate, rather thin, apex dark brown, following whorls yellowish-brown, the last being darker in colour and sub-angulate at the periphery which is ornamented by a very narrow dark brown spiral band; umbilicus encircled by a yellowish patch; suture well defined by a whitish line; whorls 5, moderately convex, slowly increasing, last descending; aperture sub-oval, grey within; peristome moderately expanded, slightly reflected, dilated at point of insertion, almost covering the umbilicus.

Maj. diam. 27; alt. 19 millim.

This species has a remarkable resemblance both in form and colouration to the Cuban *Cepolis* (*Coryda*) *alaua*, v. *strobilus*, Fér. Quite distinct from any other species of *Papuina* known to me, the nearest being *P. labium*, with which, however, it cannot be confused.

5.—*Albersia subsphoerica*, n. sp.

Pl. iv, figs. 8, 9.

Shell subglobose, moderately solid, imperforate, medium dark brown with a darker narrow spiral band bordered below by a similar one of a yellowish colour situated a little above the periphery of last whorl and continued for a short distance at the suture; covered throughout by oblique rows of close-set hair-scars; whorls $4\frac{1}{2}$, moderately convex, rapidly increasing, last shortly descending; aperture subcircular, outer band showing faintly through; peristome slightly expanded, broadened at point of insertion, a circum-umbilical dark patch, inner columellar edge white, ending abruptly below with a rather acute angular projection.

Maj. diam. 24; alt. 17 millim.

Near *A. pseudocorasia*, Strubell, but slightly more globose, the whorls are more closely coiled and the hair-scars are more numerous. The lines of growth in *pseudocorasia* are rather conspicuous at the suture, giving it a somewhat crenulated appearance, whereas in *subsphoerica* the suture is simple.

Of the three specimens before me one does not show the tooth-like projection noted in the description of the type, and the third specimen only shows it very faintly.

6.—*Leptopoma gebiensis*, n. sp.

Pl. iv, figs. 10, 11.

Shell umbilicated, subconic, moderately thick, colouration variable, generally whitish ground with reddish-brown spiral bands which are often more or less interrupted, last whorl with eight white striae, one at the periphery, four above and three below, between these are numerous much finer striae; whorls $5\frac{1}{2}$, moderately convex, last rather acutely keeled in front; aperture circular, spiral striae showing through the interior; peristome expanded, double (in adult specimens), inner edge more or less exserted, white, columellar portion narrow, broadening at lower part; operculum normal.

Maj. diam. 17; alt. 15 millim.

" 14; " 12 "

Similar in form to *L. crenilabre*, Strubell, but that species is much smoother, the peristome is less oblique and the last whorl is rounded in front, not moderately keeled as in *gebiensis*.

NOTE ON LEPTOPOMA CRENILABRE, STRUBELL.

BY HUGH FULTON.

(Pl. iv. figs. 12, 13.)

THE above species was described by Bruno Strubell in the Nachr. d. d. Malak. Gesell., 1872, p. 48. In Martini & Chemnitz, 1902, pt. clxx, p. 412, pl. 52, figs. 1—5, Kobelt describes and figures a shell purporting to be Strubell's *crenilabre*.

Having had the opportunity of examining the type specimens of *crenilabre* from the Strubell Collection, I find that they do not agree with Kobelt's description and figures, but do agree with the original description.

L. crenilabre is very near *L. vitreum*, but is of a thicker substance, and readily distinguished by the back of the peristome being more or less reticulated. Strubell describes it as being smooth, but by the aid of a lens one can just discern several spiral keels standing out from the usual microscopic spiral striae.

The shell figured by Kobelt is probably a variety of *halmahericum*, Strubell.

I give a figure of the type specimen (Pl. iv, fig. 12), and of a banded and larger specimen (fig. 13) from the collection of the late Bruno Strubell.

EXPLANATION OF PLATE IV.

- | | |
|---------------|-----------------------------------------|
| Fig. 1. | <i>Melania aeruginosa</i> , n. sp. |
| Fig. 2. | <i>Melania dulcis</i> , n. sp. |
| Fig. 3. | <i>Melania fortitudinis</i> , n. sp. |
| Fig. 4. | <i>Melania lauta</i> , n. sp. |
| Fig. 5. | <i>Jullienia carinata</i> , n. sp. |
| Fig. 6, 7. | <i>Papuina fallax</i> , n. sp. |
| Fig. 8, 9. | <i>Albersia subsphoerica</i> , n. sp. |
| Figs. 10, 11. | <i>Leptopoma gebiensis</i> , n. sp. |
| Figs. 12, 13. | <i>Leptopoma crenilabre</i> , Strubell, |

ON CERTAIN DEPOSITS OF SEMI-FOSSIL SHELLS IN HAMAKUA DISTRICT, HAWAII, WITH DESCRIPTIONS OF NEW SPECIES.

By H. WETHERBEE HENSHAW.

(Plate v.)

THE island of Hawaii, the youngest as well as the largest of the Hawaiian group, has received comparatively little attention from conchologists. This neglect no doubt is in no small degree due to the fact that the *Achatinellidae*, which have chiefly excited the interest of students, are but sparingly represented on Hawaii, there being but three species, and these by no means the most conspicuous of the group. The discovery, therefore, of deposits of fossil, or rather of semi-fossil, shells in the Hamakua district, containing a number of undescribed species, is not without interest. Before adverting to the deposits, a brief description of the region is necessary to a proper understanding of their relation to the present fauna.

The districts of Kohala and Hamakua comprise the northern end of the island of Hawaii. This is by far the oldest part of the island, and probably it had grown ancient before the fires that resulted in the upbuilding of the huge mountain mass of Mauna Kea to the south, and the still more recent Mauna Loa, were yet kindled. With little doubt then the northern end of Hawaii was first to receive its fauna from the much older islands to the north, and it in turn served as a nursery for the rest of the island as its lavas were upheaved from the depths of ocean, cooled, and were slowly clothed with vegetation.*

* The extraordinary development of the *Succineidae* upon the island of Hawaii suggests the possible hypothesis that this island, the present metropolis of the group, was the first of the Hawaiian islands to receive the *Succinea* stock, and that the other islands have been successively colonized from it rather than the converse. Even when the present comparatively extensive deforestation of the more northerly islands of the group is taken into account, the relative scarcity of the *Succineidae* upon them is difficult to understand. Dating back in origin to a vastly greater antiquity than Hawaii, the northern islands would naturally be assumed, upon a priori grounds, to have received their *Succinea* stock first; hence they should be richer in species than the comparatively recent island; the contrary is true.

There is, however, one important factor of the problem not to be overlooked. The *Succineidae* appear to have had the island of Hawaii pretty much to themselves from the very first, the comparative scarcity of other land shells there, leaving them practically without competition. Thus favoured by a comparatively free field, and with a general environment extremely favourable to their habits, the *Succineas*, though perhaps with a long start upon the other islands, having later obtained a foothold upon the big island may have attained their present rich development upon it in a comparatively short time.

As a factor in the development of the species of a group, time would appear to be a less important element than favourable environment and, above all, freedom from direct competition.

The principal competitors of the *Succineas* for food are the genera *Amastrea* and *Leptachatina*, perhaps *Carelia*, and the *Zonitidae*. All of these, but especially *Amastrea*, live chiefly upon decaying vegetation and perhaps upon the fungi found thereon. The island of Hawaii is poor in species of all these groups, *Carelia* being wholly absent, nor as a rule are any of these species strongly represented by individuals.

Upon Oahu the *Achatinellidae* proper, the *Amastreas* and the genus *Auricula* have attained a development equalled upon no other island although both Maui and Molokai are greatly favoured by the former. Upon Kauai the genus *Leptachatina* has differentiated an extraordinary number of species (many yet undescribed), and this genus and *Carelia*, the latter found upon no other island, appear to have preemoted the field. Thus several of the islands seem to have favoured one or two groups which, having once gained the ascendancy, have been able to hold it against all molluscan competitors.

Much of the coast line of Hamakua is very precipitous, especially near Waipio Valley, the cliffs there rising sheer to a height of 600—800 feet. Formerly no doubt the forest extended clear to the brink of the cliffs, but for many years past waving sugar cane has usurped the place of the forest, ever creeping steadily upwards, until now the cane fields have reached a final limit of about 1,800 feet.

Above the present limit of the cane is a belt of forest. Most of this has been fenced from cattle for the past twenty years to preserve the water supply, and in many places the land is as densely covered as it ever was with kukui, ohias, and with the usual variety of ferns, shrubs and plants that go to make up the Hawaiian forest. As rare inhabitants of the depth of this forest, but more abundant on its edges and in the partial openings, are found *Succinea inconspicua*, Ancey, *S. bicolorata*, Ancey, *S. kuhnsii*, Ancey, one or two others of the genus and a number of the minute species of land shells.

There are portions of this forest-belt where the timber is very thin, and here live on the ahakea (*Bobea elatior*, Gaud.), the ohias (*Metrosideros polymorpha*, Gaud.), and the koolea trees (*Myrsine lisseriana*, A. D. C.), the *Achatinella horneri*, Baldw., and the *A. hawaiiensis*, Baldw., species which seem to wholly shun the dense forest and inhabit only isolated trees where light and warmth abound. This open forest section has been invaded by the all-conquering "Hilo grass" (*Paspalum conjugatum*) which apparently is destined to materially affect the future of both the forest and the shells. It grows here most luxuriantly in a dense mass which effectually screens the earth from the life-giving sun, and smothers in its embrace all the seeds that fall from the trees above. To the presence of this grass in the open district here described, I attribute the fact, that, though fenced from cattle, there are absolutely no young trees coming forward, the probable result being the extinction, in the not distant future, of the trees and the shells inhabiting them.

Above the timbered belt just mentioned, and distant from the sea some six miles, are the so-called Waimea Plains. To the north and west are the Kohala mountains, which rise to the height of about 8,000 feet.

To-day the plains are almost entirely treeless, except here and there for scattered pua trees which form the home of the *Achatinella physa*. There still stand, however, many skeleton trunks of the ohia and koa trees, whose naked and broken branches like outstretched arms, seem raised in protest against the fate that has overtaken them and their fellows lying on the ground. Less than fifty years ago it is said to have been impossible to ride anywhere over the present plains except by trails because of the multitude of fallen tree trunks that everywhere blocked the way. This brings the forest down to comparatively recent times, and there is no reason to doubt the generally received tradition that a century ago the present plains were covered with an impassably dense forest, a fact essential to remember in connection with the fossil remains to be described presently.

That this forest was of the usual island type is certain, and it consisted for the most part of ohia and koa together with numerous smaller trees like the pua, kopiko, ahakea, tree lobelias and many other shrubs and berry bearing trees, with the usual tangle of ieie vines and ferns.

The forest, proper, probably never extended in this region much, if any above 3,000 or 3,500 feet. Above this altitude the slopes are steeper and the soil more scanty and rocky. Here the mamani begins to be numerous, a tree which indicates a thin and poor soil, a scanty rain supply and a considerable altitude.

The region of the Waimea plains appears never to have had a large (as compared with some other parts) rainfall. In the absence of definite data it may be assumed to be not far from 40 inches at Mana on their upper border, that figure being the average for several years in the town of Waimea as given by Professor C. J. Lyons. A small rainfall would seem to be indicated also from the fact that nowhere on the plains appear marked evidences of erosion. The deep gulches which gash the windward side of the island at short intervals are on the plains conspicuous by their absence, although nowhere are they deeper and more numerous than a few miles to the north east in the rainy Kohala mountain district. The Kohala mountains in fact, seem to intercept and rob the trades of their moisture before they reach the plains. The surface of the plains is by no means flat, but is gently and in places quite steeply rolling. On their upper edge and probably on the very edge of the former forest, at an altitude of about 3,000 feet, occur the semi-fossil deposits which form the subject of this paper. The fossils have been found in two distinct localities, viz., at Mana and at Palihoukapapa. The two places, however, are only about four miles apart, and though the latter is several hundred feet higher than the former, to all intents they may be considered conchologically to be one and the same. There is, however, some difference in the character of the deposits at the two places. At Mana the shells occur in the horizontal strata, two or three inches thick, and under a deposit of about a foot of humus. The very primitive digging implements at the writer's disposal prevented anything like a thorough examination of the extent of the deposits, but the evidence all goes to show in that in no one spot are they extensive. All that were found were included within an area of a few hundred square yards, the shell-bearing strata in some spots occupying only a few square feet, in others a few square yards.

At Palihoukapapa the deposits are, or seem to be, even less extensive, and instead of being in horizontal strata are in the nature of pockets, sometimes containing a bushel or more of shells. Over how large an area here the deposits occur there are no present means of telling.

I see no reason to doubt that the shells in both localities are entirely local in origin, and that they were swept into their present position by water resulting from local freshets. In certain favoured localities in the islands, shells

of various species occur in extraordinary abundance. In the case of the deposits in question it need be assumed only that an unusual mortality occurred simultaneously among the shells of a certain district, such as invariably follows a forest fire, and that there shortly ensued a deluge that washed the dead shells into their present abiding place. The gentle slope of the land around the deposits in both localities entirely favours this supposition.

That the shells forming the deposits cannot have been carried from any considerable distance is proven by the condition of vast numbers of the fossil *Succineas*, many of which when cleaned from dirt might almost seem to have been alive but yesterday. The steeper slopes of Mauna Kea are not more than four miles to the south west of the localities in question, but the general lay of the land, and the fact that a well defined ridge intervenes, forbids the assumption that the shells originated on the distant slopes of the mountain and were transported to their present position, even if the condition of the shells themselves did not prove the contrary.

The humus above the fossils in both localities is perfectly homogeneous, and the general absence in it of shells is especially noteworthy, indicating to the writer that the destruction of the fossils resulted from the destruction of the forest, or at any rate occurred at about the same time, the locality then ceasing, except in a small way, to be a shell producing one. Had the forest persisted after the deposition of the fossils, the humus overlying the fossils would contain evidence of the fact in the presence of shells, either of the same or of other species, which would have re-populated the forest. The grass in the neighbourhood still shelters a few small species like *Leptachatina* and *Tornatellina*, and it is probable that the genera *Pupa* and *Microcystis* are still represented here and there although none rewarded our search. Specimens of *Succinea konaensis*, Sykes, were found hard by, and the *Achatinella physa*, Newc., also is found in the neighbourhood. Dead shells of the above species were found on the surface of the ground and perhaps an inch or so below, but further down they seem to be entirely wanting.

In connection with the question of the age of the deposits, it is to be said that the humus everywhere presents the appearance of having been laid down by the natural decay and deposit of the tropical vegetation. Nevertheless, I cannot think that such is the case, but believe that most of the humus above the shells must have been washed into place subsequent to the deposit of the shells. The deposition of a foot of humus by natural decay, even in a luxuriant semi-tropical forest, must require several hundred years, and the condition of the shells generally would seem to negative any such age. It is true that in a few places the shells have been reduced to lime, all semblance of their form and character having disappeared. On the other hand, thousands of the frail *Succineas*, *Tornatellinas*, and *Pupas*, as well as many of the more substantial species like the *Amastras* and the *Achatinellas* are but slightly affected by time.

That the deposits of fossils are confined to the two localities in question is not for a moment to be believed. A well-worn trail at Palihoukapapa, and some deep holes dug by cattle at Mana, chanced to reveal the presence of the shells in these two localities ; but no doubt there are similar deposits in many other places on the Waimea Plains and elsewhere in the northern end of the island. Indeed the author has heard that in the district of Kohala such deposits are by no means uncommon.

In a paper published in 1887 (Hawaiian Annual), Mr. D. D. Baldwin speaks of extensive portions of the Hamakua and Kona districts at altitudes of 3,000 to 5,000 feet, "where the soil is filled with millions of sub-fossil shells of this [*Succinea*] family." In a recent letter to the writer, Mr. Baldwin mentions these deposits more in detail, and states that he made several hurried trips to the region above Honakaa and in the vicinity of Waimea in the years from 1865 to 1872 and again in 1878. In all of the open country above the forest, the ground was "white with dead *Succineas* and probably other shells." The shells were quite evenly distributed through the light surface soil." Later, through the agency of floods, the surface shells here mentioned may have been swept into pockets and so formed deposits similar to those examined by the writer.

Indeed, in several specimens of *Succinea*, faint traces of colour are still visible, the original deep red or maroon having faded to pink. The same is true of some of the smaller shells.

In a climate like that of Arizona and in dry earth even frail shells might be preserved almost intact for several hundred years; but the climate of the Waimea plains is by no means a dry one in this extreme sense. Heavy dews are the rule all through the year, and rains are probably frequent enough to keep the humus damp all the time except in seasons of drought when it is likely to dry for a few inches only from the top. That frail shells like the *Succineas* could long be preserved in damp and porous humus, even though a foot from the surface, is not credible. All things considered, it does not seem likely that the fossil shells date back more than a century, and it is probable that they and the forest perished at the same, or nearly the same time.

As to some extent confirmatory of the theory of the recent age of the shells, the writer has recently learned that about fifty years ago, more or less, an extensive forest fire raged in this section, and this may have been the cause of the simultaneous destruction of such vast quantities of mollusca.

The following *Succineas* are believed to be undescribed species. All four are without doubt extinct in the region in question.

In examining several thousand specimens of these semi-fossil *Succineas*, one cannot fail to be impressed with the considerable diversity in shape and size of individuals, presumably of the same species. The difficulty in treating such materials consists not in the finding of new species but rather in the exercise of due restraint in naming forms evidently closely related to living

species but exhibiting greater or less differences. Living species of this group are difficult enough of determination, even with the aid of abundant material and field notes. How much greater the chances of error with only fossil material available! The author has intended to be extremely conservative in describing forms, preferring to leave a few for future describers rather than to add to the number of synonyms, already too many, in this group.

***Succinea maxima*, n. sp.**

Pl. v, figs. 1, 2.

Shell elongate, narrow, rather thick, lines of growth fairly distinct. Spire very small, considerably less than $\frac{1}{3}$ the whole length of shell, conical, slightly produced, apex mammilliform, suture moderate. Whorls, 3; ultimate whorl very large. Aperture large, but slightly oblique, ovate, reduced above. Columella but slightly curved. Peristome simple, acute.

Long. 24, lat. 11.5 millim.; long. apert. 16 millim.

Hab.—Mana, Hamakua, Hawaii.

This species is without doubt the largest of the genus yet discovered in the Hawaiian Islands, and differs also otherwise from described forms. The axis of the shell is nearly medial, the apex forming but a very slight angle with the body of the shell. The apex is very small in comparison with the last whorl, averaging less than one-third the length of the latter. A single specimen of this species was found in the Palihoukapapa deposits, but the species abounds in those at Mana.

***Succinea mirabilis*, n. sp.**

Pl. v, figs. 3, 4.

Shell moderately thick and firm, acutely cone-shaped with very obliquely truncated base; lines of growth distinctly marked; spire relatively large, autish, mammilliform, composed of two convex whorls with well-defined sutures; aperture rather narrowly ovate, rather less than two-thirds the length of the shell; columella decidedly curved and slightly reflexed; peristome simple, acute.

Long. 16, lat. 8 millim.; long. apert. 11 millim.

Hab.—Palihoukapapa, Hamakua, Hawaii.

As regards its shape, this shell is far the most remarkable of Hawaiian *Succineas*, living or extinct. The lower whorl spreads widely, and the aperture is so oblique to the axis that, when the shell is placed on its base, the apex makes a very acute angle. The apex is also very large as compared with the lower whorl, being contained in the latter only twice. The species appears to be only moderately abundant in the deposits.

This species bears a very remarkable resemblance to the *S. injundibuliformis*, Gould, from Tahiti.

Succinea pristina, n. sp.

Pl. v, figs. 5, 6.

Shell elongate, moderately thick (in large individuals very thick), lines of growth usually moderately marked (in some large specimens strongly so); spire produced, nearly half the length of shell, apex acute, suture moderate; whorls $3\frac{1}{2}$ —4; aperture only of moderate size, narrowly ovate, but slightly oblique to axis of shell; columella moderately curved; peristome simple, acute, thin.

Long. 17.5, lat. 8 millim.; long. apert. 8 millim.

Hab.—Mana, Hamakua, Hawaii

This species differs markedly from the previous one, especially in lacking the spreading base, and in the much less oblique aperture. Its relations are much closer with the *S. protracta*, Sykes. It appears, however, to have been much larger than this species, and the shell is much thicker, *protracta* being one of the most fragile of Hawaiian *Succineas*. *Pristina* appears to be even more closely related to the *S. procer*a, Gould.

One individual, considerably the largest of fifteen, measures as follows: Long. 21, lat. 11 millim.; long. apert. 13 millim.

The colouration of this species when in life probably differed much from that of *protracta*, which is brown or horn colour. A single specimen of *pristina* has retained its colour sufficiently to show that the columella and base were of a deep red or maroon like the *S. thaamumi*, Anc., and the *S. bicolorata*, Anc.

Succinea gibba, n. sp.

Pl. v, figs. 7, 8.

Shell broadly ovate; lower whorl large and strongly convex; lines of growth but slightly defined; spire very short, obtuse, mammilliform, of two whorls, less than one-third whole length of shell; suture shallow and narrow; whorls 3; aperture large, broadly ovate; columella much curved, slightly reflexed posteriorly; peristome simple, acute.

Long. 20, lat. 12 millim.; long. apert. 14 millim.

Hab.—Mana, Hamakua, Hawaii.

This species seems to be quite distinct from any of the insular forms. It is chiefly remarkable for its great size and for the very marked convexity of the lower whorl.

Below is appended a complete list of the semi-fossil shells found in the above mentioned localities. Thorough investigation of the deposits and of others in the northern part of Hawaii, will no doubt add other species to the list and also reveal additional undescribed forms.

The smaller species have all been identified by Mr. Ancey from material sent him, and the author is greatly indebted to this conchologist for a list of the forms detected by him including the new species. Where Mr. Baldwin or the author are responsible for the identifications, this fact is indicated by the name in brackets.

As will be noticed the greater number of forms from the deposits are of species still existing, either on Hawaii or the others islands. The list contains representatives of most of the genera of Hawaiian land shells, and the number of genera as well as species sufficiently attest the former wonderful richness in molluscan life of this particular region.

1. *Achatinella physa*, Newc.
Abounds in the deposits of Mana. Mr. Ancey is inclined to view this shell as a new variety because of its size, an idea at first shared by the author who now, however, adopts Mr. Baldwin's opinion of its specific identity with *physa*.
2. *Achatinella horneri*, Baldw. [Henshaw].
Two or three individuals only from Mana deposits which are several hundred feet above the present usual range of the species.
3. **Amastra senilis*, Baldw. [Baldwin]. Very abundant at Palihoukapapa.
4. * „ *fossilis*, Baldw [Baldwin]. Common at Palihoukapapa.
5. „ *flavescens*, Newc. [Henshaw]. Rare in the Mana deposits but abundant enough living at an elevation of 2,000 feet or so.
6. **Amastra conica*, Baldw. [Baldwin].
7. * „ *sinistrorsa*, Baldw. [Baldwin].
8. **Pseudohyalinia meniscus*, Anc.
9. *Vitrea hawaiiensis*, Anc.
10. **Punctum horneri*, Anc.
11. *Endodonta laminata*, Pse.
12. „ *nuda*, Anc.
13. * „ *henshawii* Anc.
14. * „ *hystricella*, Pfr. var. *paucilamellata*, Anc.
15. „ *lanaiensis*, Sykes.
16. *Nesopupa acanthinula*, Anc.
17. „ *sp.*
18. „ *baldwini*, Anc. var. *centralis*, Anc.
19. *Lyropupa perlonga*, Pse.
20. * „ *mirabilis*, Anc. var. *hawaiiensis*, Anc.
21. * „ *magdalenae*, Anc. var. *prisca*, Anc.
22. *Leptachatina henshawii*, Sykes.
23. „ *konaensis*, Sykes.
24. „ *arborea*, Baldw.
25. „ *simplex*, Pse.
26. „ *sp.*
27. „ *imitatrix*, Sykes.
28. „ *sp.*
29. *Tornatellina newcombi*, Pfr. ?
30. „ *cincta*, Anc.
31. „ *procerula*, -Anc.
32. „ *macromphala*, Anc.

33. ,, *extincta*, Anc.
 34. ,, *oblonga*, Psc.
 35. ,, *compacta*, Sykes.
 36. ,, *fusca*, Anc.
 37. * ,, *rudicostata*, Anc.
 38. * ,, *cyphostyla*, Anc.
 39. **Succinea maxima*, Hensh. [Henshaw]. Very numerous, Mana deposits.
 40. * ,, *gibba*, Hensh. [Henshaw]. Numerous, Mana deposits.
 41. * ,, *mirabilis*, Hensh. [Henshaw]. Not numerous in Palihouk-
 apapa depoits.
 42. * ,, *pristina*, Hensh. [Henshaw] Comparatively uncommon in
 Mana deposits.
 43. ,, *inconspicua*, Anc. [Henshaw]. Abundant in Palihoukapapa
 deposits and also living over much of the region.
 44. ,, *konaensis*, Sykes. [Henshaw]. Abundant in Palihoukapapa
 deposits and also living in same region.
 45. ,, *aurulenta*, Anc. [Henshaw]. Numerous in Palihoukapa de-
 posits Found living as yet only in Kona.
 46. ,, *kuhnsii*, Anc. [Henshaw]. Abundant in Palihoukapapa de-
 posits ; also living in same region
-

EXPLANATION OF PLATE V.

Figs. 1, 2. *Succinea maxima*, n. sp.Figs. 3, 4. *Succinea mirabilis*, n. sp.Figs. 5, 6. *Succinea pristina*, n. sp.Figs. 7, 8. *Succinea gibba*, n. sp.

REPORT ON SEMI-FOSSIL LAND SHELLS FOUND IN THE HAMAKUA DISTRICT, HAWAII.

BY C. F. ANCEY.

(Plate v.)

THE shells listed in the following pages were discovered at a place called Palihoukapapa, on the Hamakua slope of Mauna-Kea, Kawaii, at an elevation of 4,000 feet. Professor Henshaw has kindly sent me some dirt in which the minute species were found. He reports other similar localities on the same island "where there are extensive deposits of fossilised land shells about a foot below the surface of humus. Nearly all the known genera of Hawaiian land shells are represented in these deposits by species, some still extant, others probably now extinct."

1.—*Pseudohyalinia meniscus*, n.sp.

Pl. v, figs. 9, 10.

Testa perdepressa, tenuissima, emortua alba, haud nitens, latissime umbilicata, sub lente striis obliquis incrementi, parum profundis, confertim exarata; spira leviter convexa vel fere plana, anfractus $3\frac{1}{2}$, regulariter sed subceleriter crescentes, convexi, sutura impressa, ultimus depressus, soepe ad aperturam leniter deflexus, infra concavus, umbilico tertiam partem diametri superante, apertura obliqua, transverse oblonga, parum lunata, margine supero antice convexi prodeunte; peristoma simplex, rectum, ad columellam haud dilatatum.

Diam. maj. $1\frac{2}{3}$, min. $1\frac{1}{3}$; alt. $\frac{1}{2}$ millim.

A more depressed shell than *P. kauaiensis*, Pfr., more distinctly sculptured and with a much larger umbilicus. It may be referable to *Charopa* rather than *Pseudohyalinia*.

2.—*Vitrea hawaiiensis*, n.sp.

Differt a *V. molokaiensi*, Sykes, et a *V. lanaiensi*, Sykes, testa magis elevata, anfractibus altius convolutis et umbilico minore; a *V. paucillo*, Gould, cui peraffinis differt etiam testa minus depressa, paulo convexiore, colore luteo-virescente, umbilico profundiore, circulari.

Diam. maj. $4\frac{1}{3}$, min. $3\frac{2}{3}$; alt. $2\frac{1}{3}$ millim.

The above description is from recent specimens found on Olaa, Hawaii, by Mr. Thaanum. A single specimen from Palihoukapapa is referable to his species.

3.—*Punctum horneri*, n.sp.

Pl. v, figs. 11, 12.

Testa depressa, tenuis, orbicularis, emortua albida vel pallide fulvida, apice pallidior laevigata excepto striis exilibus incrementi subtiliter exarata; spira convexa, parum elevata, obtusa; anfractus 4 convexiusculi, sutura impressa discreti, regulariter atque lente crescentes, ultimus convexiusculus, circa umbilicum mediocrem, quartam diametri partem paeno aequantem subdepressus; aperatura subobliqua, lunata, subrotundata; peristoma acutum, haud dilatatum, marginibus distantibus.

Diam. maj. 1, min. 1; alt. $\frac{1}{2}$ millim.

This minute shell is closely allied to the European *P. pygmaeum*, Drap. It is also recent on Oahu.

4.—*Endodonta laminata*, Pease.

Pl. v, figs. 13, 14.

Not hitherto recorded from Hawaii. The specimens of this and the following *Endodontae* retain their usual coloured brown stripes on a pale ground.

5.—*Endodonta (Thaumatodon) nuda*, Anc.

One or two imperfect examples seem to be referable to this species, originally described from fresh specimens from Olaa, Hawaii.

6.—*Endodonta (Thaumatodon) henshawi*, n.sp.

Pl. 5, figs. 15, 16.

Testa parva, orbicularis, emortua alba, vestigiis strigarum fuscaram plerumque, superne praesertim eleganter lateque maculata, costulis acutis confertis (circa 45 in ultimo anfractu), radiantibus insculpta, haud nitida, aperte et mediocriter umbilicata; spira convexiuscula, parum elevata; anfractus 4—4 $\frac{1}{4}$ convexi, sutura impressa discreti, regulariter crescentes, ultimus cylindricus, flexuose costulatus; apertura parum obliqua, lunato-circularis, in pariete laminis duabus volventibus et in interiore basis marginis dextri denticulis 5 acutis aequidistantibus (2 superis soepe obsoletis) armata; peristoma simplex, ad columellam nullomodo dilatatum; umbilicus tertiam diametri partim haud superans.

Diam. maj. 2, min. $\frac{1}{2}$; alt. 1 millim.

This is the smallest member of the group of *E. contorta*, Fér., hitherto described. The apertural armature is very much alike in *E. nuda*, *E. ringens*, and *E. contorta*. A similar species, also probably extinct, but with a larger umbilicus, was detected by the Rev. E. W. Thwing, in an extinct crater of the Kona coast; it is undoubtedly another new species which I propose to name *E. thwingi*, after its discoverer. The present one, which seems to be abundant, is respectfully dedicated to Professor Henshaw, to whom I am much indebted for the whole of the material now considered, and for valuable notes on other Hawaiian shells.

7.—Endodonta hystricella, Pfr. var. **paucilamellata**, n. var.

Pl. v, fig. 17.

Testa orbicularis, rotuliformis, convexo-depressa, aperte sed mediocriter umbilicata (umbilicus circa 1 millim. latus), subfossilis alba, late fulvo strigata, strigis in ultimo anfractu fulminatis; costulis acutis, subarcuatis, dehinc flexuosis ornata; spira convexa, parum elevata, apice planato; anfractus 5 convexi, regulariter crescentes, sutura perimpressa, ultimus cylindricus, in adultis supra medium ad aperturam plano-declivis: apertura obliqua, lunato-rotundata, marginibus acutis haud expansis, pariete laminis volventibus 2, supra paulo validiore munito.

Diam. maj. vix 5, min $4\frac{1}{2}$; alt. 2 millim.

I have not been fortunate enough to procure authentic specimens of *E. hystricella*, but refer to Pfeiffer's species some shells from Makawao, Maui. These have, however, three palatal laminae, while in the subfossil form there are more. Hence these are possibly specifically distinct, as moreover the true *E. hystricella* has not yet been found on Hawaii. However, I prefer to subordinate them to the latter, because besides the laminae there are not many differences. It is right to observe that in some allied forms the palatal laminae present in typical examples are reduced in number or even wanting in others. I am therefore confident that *Nesophila*, Pilsbry, a sectional name based on that feature, has no value whatever, unless it may be retained for *Helix tiara*, Mighels, a large form of quite a distinct type, from the island of Kauai. In general shape and contour this is much like *Stephanoda dissimilis*, d'Orb., from Chili, but the palate is furnished with small parallel and numerous revolving lirae.

8.—Endodonta lanaiensis, Sykes.

A single good specimen. Greatest diam. 4, high $1\frac{1}{2}$ millim.

9.—Nesopupa acanthinula, Anc.

Rare, but frequent in a living state in Oahu, Hawaii, and probably other islands.

10.—Nesopupa, sp.

A single broken specimen, with the teeth of *Pupa newcombi*, but larger and more elongate. A similar but smaller form is found living on Oahu and Hawaii.

11.—Nesopupa baldwini, Anc. var. **centralis**, Anc.

Also found living at Olaa, Hawaii (Thaanum). This and others mentioned in the present paper will be fully illustrated in other contributions to the malacological fauna of the Hawaiian islands actually in the press. The typical specimens, with a more produced spire of $5\frac{1}{2}$ whorls are from Molokai and Maui.

12.—*Lyropupa perlonga*, Pease.

The identification is somewhat doubtful, as I have never met with Oahu specimens and all those I have seen from Hawaii (Palihoukapapa, Mana, and an extinct crater on the Kona coast) are subfossil. They are, however, in fair condition and of a brown or dark colour. The description and figure given by Boettger (Conch. Mittheil., i, p. 69, pl. xii, fig. 16) apply tolerably well to these. They measure $2\frac{1}{2}$ millim. in length and $1\frac{1}{2}$ in diameter, and have $5\frac{1}{2}$ whorls. The long superior palatal lamella extends on the peristome and forms, with a well developed angular fold a small, circular, nearly closed sinus. There are about 15 or 16 riblets on the last whorl.

Lyropupa perlonga and *L. costata*, Pease (= *rubana*, Dall) are, I think, the only dextral forms of the group.

13.—*Lyropupa mirabilis*, Anc. var. *hawaiiensis*, n. var.

Pl. v. fig. 18.

Differt a typo (ex montibus "Waianae" insulae Oahu) testa plerumque paulo majore, robustiore, costulis pallidis, dente lamelliformi infero in fauce aperturæ magis valido et elongato; anfract 6.

Long. $2\frac{1}{2}$, diam. $1\frac{1}{4}$, long. apert. $\frac{3}{4}$ millim.

There are twenty or twenty-two costulae on the last whorl, while in the type specimen there are about twenty-two to twenty-four, and there is no trace of a pale ill-defined zone on the last whorl. The angular lamella is weakly developed and scarcely produced, in fact reduced to a mere tubercle.

14.—*Lyropupa magdalenæ*, Anc. var. *prisea*, n. var.

Pl. v. fig. 19.

This form agrees pretty well with Boettger's figure of *Pupa lyrata*, Gould, (Conch. Mitth., i, p. 61, pl. xii, fig. 17), but I do not think it may be taken as the true *L. lyrata*. Numerous sinistral species and forms, all very much alike, have been shown to exist on the various islands of the Hawaiian group, and one of these, from Olaa, I have referred to *Pupa lyrata*, although I am by no means certain of the identity. Gould's description should equally be applied to other things, but not to species with a strong angular fold such as this. The diagnosis of the subfossil specimens of Palihoukapapa is as follows:

Differt a typo (ex Palama ins. Oahu) habitu plerumque magis cylindrico, costis validioribus, albescentibus, zonula pallida conspicua in parte superiore anfractus ultimi et rima umbilicari minus aperta.

Long. 23, lat. $1\frac{1}{2}$ millim.

I observed about 15 to 17 ribs on the last whorl, while I counted about 15 in the examples of the typical lot from Oahu. There are 14 in number in another new species detected at Olaa, Hawaii (*L. clathratula*), a form in which the upper palatal lamella does not reach the outer edge of the peristome. In *L. lyrata*, or rather the one I ascribe to *lyrata*, there are 12 strong distant

ribs on the last whorl ; its palatal folds are very close to each other, the most deeply seated (the inferior) beginning near the end of the superior. Besides, there is a very slight point-like denticle far within the base.

15.—*Achatinella physa*, Newc. var. *procera*, Anc.

I have not seen good full-grown examples, but refer, with some doubt, a very young shell to this.

Mr. Sykes has changed the well-known name *A. physa*, Newc., to *confusa*, Sykes, because he supposed *A. havaiiensis*, Bald., to equal the true *physa*. Mr. Baldwin writes that his *havaiiensis*, was discovered in a spot unexplored when Newcomb described his *physa*, hence the latter name may stand for what is generally distributed in collections, from the Kohala mountains and the Hamakua slope of Mauna-kea.

16.—*Amastra senilis*, Baldw.

17.—*Amastra fossilis*, Baldw.

18.—*Amastra*, sp.

A juvenile specimen, with conic spire and keeled body-whorl, probably distinct from the former species.

19.—*Leptachatina henshawii*, Sykes.

Probably referable to this species, although not so strongly sculptured.

20.—*Leptachatina konaensis*, Sykes.

21.—*Leptachatina arborea*, Baldw.

22.—*Leptachatina simplex*, Pease.

23.—*Leptachatina*. sp.

A puzzling form, somewhat like the Maui *L. grana*, Newc.

24.—*Leptachatina imitatrix*, Sykes.

25.—*Leptachatina*, sp.

Like the latter, but larger and with a more produced spire.

26.—*Tornatellina newcombi*, Pfr. (?)

27.—*Tornatellina cineta*, Anc.

Quite identical with typical specimens found in a living state on Maui, Oahu, and Hawaii.

28.—*Tornatellina procerula*, Anc.

Large examples. Also from Maui.

29.—*Tornatellina macromphala*, Anc.

Also from Maui.

30 —*Tornatellina extineta*, Anc.

Found at first subfossil in the sandy isthmus between East and West Maui. I received later fresh specimens collected at Kaupakalua, Maui, by Mr. Baldwin.

31.—*Tornatellina oblonga*, Pease.**32.—*Tornatellina compacta*, Sykes. (?)****33.—*Tornatellina fusca*, Anc.**

One or two young specimens of this remarkable species.

34.—*Tornatellina rudicostata*, n. sp.

Pl. v. figs. 20, 21.

Testa oblongo-attenuata, perforata, emortua albida (statu recenti verisimiliter cornea), iris confertis acutis fere rectis, parum regularibus, in ultimo subflexuosis insigniter exarata; spira sat producta, conoidea, obtusula; anfractus 6 convexi, regulariter crescentes, sutura impressa propter plicas crenulata discreti; primi laevigati, ultimus oblongus, parum attenuatus, dorso et versus aperturam sulco mediano concentrico impressus; apertura vix obliqua, subirregulariter truncato-ovalis, in adultis, lamina parietali valida excepta inermis; columella incrassatula, arcuata; peristoma acutum, rectum, margine columellari dilatato, expanso.

Obs. Apertura in junioribus, praeter laminam parietalem plicis acutis duabus columellaribus et lamina transversa longa volventi in interiore palati armata.

Long. $2\frac{1}{2}$, diam. $1\frac{1}{4}$; alt. apert. $\frac{3}{4}$ millim.

An extraordinary species, quite unlike anything described in the genus. The general aspect is that of a very small *Leptachatina henshawi*, but the plicae are coarser and irregular. The sculpture is quite unusual in the genus. No living forms are allied to this.

35.—*Tornatellina cyphostyla*, n. sp.

Pl. v, figs. 22, 23.

Testa conoideo-oblonga, gracilis, laevigata, subfossilis alba, tenuis, nitida, aperte sed minute perforata; spira conica, elongata, lateribus rectis, summo obtuso; anfractus 6 parum convexiusculi, regulariter crescentes, sutura lineari, appressa discreti, ultimus oblongus, subattenuatus; apertura distincte obliqua, truncato-ovalis, lamina unica volventi validiuscula in pariete armata; columella regulariter arcuato-declivis, subincrassata, inermis; peristoma simplex, acutum, rectum, margine extero post insertionem arcuato, columellari expanso, perforationem haud claudente,

Obs. *Columella juniorum* biplicata.

Long. $2\frac{3}{4}$, diam. $1\frac{1}{3}$; alt. apert. 1 millim.

A very distinct species, of regular outline. Its principal characters are the conic spire, barely convex whorls, appressed sutures and oblong aperture not at all widened below and slightly oblique. The columellar margin is gently curved and without plicae except in young specimens, and the parietal lamella is rather strong.

36.—*Succinea*, sp.

Related to *S. cepulla*, but more oblong, and to *S. souleyeti*, Anc., which is, I think, distinct from *cepulla*.

37.—*Succinea*, sp.

Allied to *S. kuhnsi*, Anc., but not quite so oblique.

38.—*Succinea*, sp.

Like the preceding one, but more slender and more pointed spire,

39.—*Succinea inconspicua*, Anc.

40.—*Succinea*, sp.

A single specimen of a peculiar form, next to *S. casta*, Anc. var *henshawi*, Anc., but smaller and more elongate.

41.—*Succinea*, sp.

This groups with *S. tetragona*, Anc., of Maui and *S. quadrata*, Anc., of Oloa, Hawaii. In most specimens there is a well marked angular shoulder on the upper of the last whorl.

Although most of the *Succineae* are probably new species, though in some instances, very near to some of the recent forms, I do not wish to name them, because they will be described and figured by Professor H. W. Henshaw.

EXPLANATION OF PLATE V.

Figs. 9, 10. *Pseudohyalinia meniscus*, n. sp.

Figs. 11, 12. *Punctum horneri*, n. sp.

Figs. 13, 14. *Endodonta laminata*, Pease.

Figs. 15, 16. *Endodonta (Thaumatodon) henshawi*, n. sp.

Fig. 17. *Endodonta hystricella*, Pfr. var. *paucilamellata*, n. var.

Fig. 18. *Lyropupa mirabilis*, Anc. var. *hawaiiensis*, n. var.

Fig. 19. *Lyropupa magdalenae*, Anc. var. *prisca*, n. var.

Figs. 20, 21. *Tornatellina rudicostata*, n. sp.

Figs. 22, 23. *Tornatellina cyphostyla*, n. sp.

CURRENT LITERATURE.

Baker, F. C.—The Molluscan Fauna of the Dells of Winconsin. Trans. Ac. Sc. St. Louis, 1904, vol. xiv, pp. 99—105.

Baker, F. C.—Notes on *Planorbis truncatus* Miles. Ibid., pp. 107—110.

The writer is of opinion, after examining several thousand specimens of *P. trivolvis* and comparing them with examples of *P. truncatus*, that the latter is the ancestral form of the former species, and not *vice versa* as he has previously stated.

Baker, F. C.—The Arrangement of the Collection of Mollusca in the Chicago Academy of Sciences. Mus. Journ., 1904, vol. iii, pp. 354—360, pl. xlv.

Girty, George H.—New Molluscan Genera from the Carboniferous. Proc. U.S. Nat. Mus., 1904, vol. xxvii, pp. 721—736, pls. xlv—xlvii.

The new genera and species described and figured are : *Limipecten texanus*, *Pleurophorella papillosa*, *Clavulites howardensis*, and *Schuchertella*, n. nom., "proposed for shells having the type of structure for which the name *Orthotheles* is at present in use." Type *S. lens*, White.

Hedley, C.—The Effect of the Bassian Isthmus upon the existing marine fauna : a study in ancient geography. Proc. Linn. Soc. N.S.W., 1903, pp. 876—883.

Hedley, Charles.—Additions to the Marine Molluscan fauna of New Zealand. Rec. Aust. Mus., 1904, vol. v, pp. 86—97, figs. 14—25.

The new genera and species are : *Pleurodon maorianus*; *Verticipronus mytilus*, gen. and sp. nov., referred with some doubt to the *Carditidae*; *Schismope brevis* and *S. rosca*; *Incisura*, nov. gen., type *Scissurella lytteltonensis*, Smith; *Puncturella demissa*, *Liotia polypleura*, *Caccum digitulum*, *Couthonia corrugata*, *Rissoa suteri*, *Eulima paxillus*, and *Leiostraca murdochi*.

Pecten aviculoides, Smith, is transferred to the genus *Cyclopecten*, *Carditella delta*, Tate and May, to *Cuna*, and *Daphnella substriata*, Suter, to *Mitromorpha*, thus adding three genera and two species new to the New Zealand fauna.

Sykes, E. R.—Description of two new species of *Melania* from the New Hebrides. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 13, 14, figs. 1, 2.

The two new species are *M. morti* and *M. cingulifera*.

Sykes, E. R.—On the Mollusca procured during the "Porcupine" Expeditions, 1869—1870. Supplemental Notes, Part I. Ibid., pp. 23—40, pl. iii.

This is an exceedingly valuable piece of work, and no one is better qualified to undertake it than Mr. Sykes.

Numerous points in nomenclature are dealt with, two new species are described and figured, viz., *Retusa marshalli* and *Cyllichna obscura*, and figures are given of *C. hoernesii* (Weinkauff), *C. elongata* (Jeffreys), *Acteon globulinus* (Forbes), *Bulla striatula*, (Forbes), *Retusa lactea* (Jeffreys), and *R. excavata* (Jeffreys).

Sykes, E. R.—The Hawaiian species of *Opeas*. Ibid., pp. 112, 113, figs. 1—4.

Figures of *O. junceus* (Gould), *O. pyrgiscus* (Pfr.), and descriptions and figures of *O. henshawi*, n. sp., and *O. prestoni*, n. var. *hawaiiensis*.

Sykes, E. R.—On the Polyplacophora. In Herdman, Report . . . on the Pearl Oyster Fisheries of the Gulf of Manaar. Part I, Suppl. Rep. iv, pp. 177—180, pl. i. London, 4to, 1903.

The collection includes nine species. Of these, three are identified (one doubtfully) with known forms; one species of *Callochiton*, three of *Ischnochiton*, and one of *Tonicia*, are new.

Sykes, E. R.—Zoological Record, 1903, vol. xl. Div. vii. Mollusca. London: July 1904.

This invaluable work reaches us considerably earlier than in previous years, and although possibly not quite so complete as in former years, it is a great advantage to have the same so promptly.

So far as the general Record is concerned there are no salient alterations, but the cross references are perhaps not so complete as in previous issues.

Pallary, Paul.—Additions a la faune conchyliologique de la Méditerranée. Ann. Mus. d'Hist. Nat. Marseille—Zoologie—1903, T. viii, pp. 5—16, pl. i.

Pallary, Paul.—Quatrième contribution a l'étude de la faune malacologique du Nord-Ouest de l'Afrique. Journ. de Conchyl., 1904, vol. lii, pp. 5—58, pls. i—iii.

In this interesting memoir the author describes and figures a peculiar *Parmacella*-like shell for which the genus *Vaucheria* is established. *V. lingitana*, the type, is known from the shell only, which is dextral and larger than any known form. It is to be hoped that Mr. Pallary will ultimately succeed in finding the living animal.

Many new species of *Helix* are described and figured, as well as new species of *Limnæa*, *Valvata*, and *Melanopsis*.

Hoyle, W. E.—A Diagnostic Key to the Genera of Recent Dibranchiate Cephalopoda. Mem. and Proc. Manchester Lit. and Phil. Soc., 1904, vol. xlviii, No. 21, pp. 1—20.

What must prove a most useful aid to workers on the recent Dibranchiate Cephalopoda, has been drawn up by Dr. Hoyle in preparation for a systematic account of the recent Cephalopoda to be published in the "Tierreich" of the German Zoological Society and Berlin Academy.

Eliot, C.—On some Nudibranchs from East Africa and Zanzibar. Part III. Proc. Zool. Soc. Lond., 1904, pp. 354—385, pls. xxxii—xxxiv. Part IV. Ibid., pp. 380—406, pls. xxiii, xxiv.

The author, in these two papers, treats of the Cryptobranchiate Dorids, which are represented by 49 species of which 1 genus and 25 species are new. In examining the value of the chief points by which the sub-families and genera under consideration can be differentiated, it is pointed out that such characters as the rhinophores and branchial and the generative organs are disappointing as a means of classification; while the characters of the dorsal surface and general texture, the foot, and the mouth parts are regarded as forming a fairly good indication of relationship. The internal organs, in the author's opinion do not offer many features which serve for the purpose of classification.

Bartsch, Paul.—A new *Ashmunella* from New Mexico. Smithsonian Miscell. Coll., 1904, vol. 47, pp. 13, 14.

Ashmunella townsendi, n. sp., is most nearly related to *A. rhyssa*, Dall, but is much smaller than that form and is uniformly more strongly sculptured. Loc. Ruidoso, New Mexico.

Hyde, Ada H.—The Nerve Distribution in the Eye of *Pecten irradians*. Mark Annivers. Vol., 1903, pp. 471—482, 1 pl.

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- Rice, E. L.**—Preliminary Report on the Development of the Gill in *Mytilus*. Ohio. Nat., 1904, vol. iv, p. 51.
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- Smallwood, W. M.**—Natural History of *Haminca solitaria* Say. Amer. Nat., 1904, vol. 38, pp. 207—225, 16 figs.

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DESCRIPTIONS OF SOME NEW SPECIES OF
CINGALESE AND INDIAN MARINE SHELLS.

BY H. B. PRESTON, F.Z.S.

(Plates vi and vii.)

The species about to be described formed part of the collection of the late Mr. Hugh Nevill, who was for many years resident in Ceylon, and a portion of whose collection came into my hands upon its dispersal during the early part of the present year. Although exact localities were often not given, all the present species, with one exception, are undoubtedly from Ceylon,

Cythara nevelliana, n. sp.

Pl. vii, figs. 1, 2.

Shell subfusiform, obtuse, solid, uniformly white; whorls 5—6, convex, coarsely ribbed and spirally grooved, giving the shell a cancellated appearance; suture impressed; aperture high and narrow; columella curved, somewhat rough; peristome slightly thickened and bent inwards over the aperture, the edge being serrated by the spiral grooves.

Alt. 5 millim.; diam. maj. 2.5. Aperture, alt. 3 millim.; diam. .5.

Hab.—Ceylon.

Clathurella bulleni, n. sp.

Pl. vii, figs. 3, 4.

Shell ovate, solid, brownish lilac, or ornamented on the last whorl with a broad peripheral yellowish-white band, and on the earlier whorls with a very narrow, but distinct, band of a similar hue; whorls 8, convex, transversely ribbed and spirally grooved, giving the shell a coarsely granulated appearance; suture well impressed; aperture narrow, one third of the height of the whole shell; columella curved; peristome thickened and bent inwards.

Alt. 6 millim.; diam. maj. 3. Aperture, alt. 2 millim.; diam. .5.

Hab.—Ceylon.

Thala ceylanica, n. sp.

Pl. vi, figs. 1, 2.

Shell slender, attenuated; whorls 7—8, sculptured with closely set transverse ridges crossed by finer spiral lines, giving the shell a granulated appearance; colour pink, mottled and streaked with white and pale chestnut, the latter colour developing into a broad peripheral band on the body-whorl; aperture narrow; columella four-plaited; peristome thickened and slightly notched above.

Alt. 10 millim.; diam. maj. 2.5. Aperture, alt. 4 millim.; diam. maj. .5.

Hab.—Ceylon.

Nassa (Phrontis) siva, n. sp.

Pl. vi, figs. 3, 4.

Shell ovately conic, spirally striated, especially on the apical whorls and lower portion of the body-whorl, and coarsely ribbed throughout except on the last half of the body-whorl, where the lower portion of the ribs becomes obsolete; whorls 8—9, somewhat convex, pale brownish-yellow, ornamented with two chestnut bands; suture impressed; columella distinctly plaited, expanded and extending above into a callosity bearing a single plait near the junction of the peristome with the whorl above; peristome thickened and slightly reflexed, having five denticles just inside the aperture, the uppermost being more strongly developed than the others; aperture obliquely ovate; canal short and rather broad.

Alt. 12.5 millim.; diam. maj. 6.5. Aperture, alt. 6 millim.; diam. maj. 2.

Hab.—Ceylon.

Nassa (Phrontis) gangetica, n. sp.

Pl. vi, figs. 5, 6.

Shell fusiform, spirally striate (at the base only) and coarsely ribbed except on the last half of the body-whorl, where the surface becomes quite smooth bearing only a row of tubercles just below the suture; whorls 8, fawn colour; suture impressed; columella extending into a callosity reaching to the junction of the peristome with the whorl above and bearing a plait in this region; peristome thickened, slightly reflexed having two obsolete plaits on the inner surface; aperture ovate; canal short; operculum horny, unguiform, with an apical nucleus.

Alt. 10.5 millim.; diam. maj. 4.5. Aperture, alt. 3 millim.; diam. maj. 1.

Hab.—Calcutta.

Murex (Ocenebra) sykesi, n. sp.

Pl. vi, figs. 7, 8.

Shell ovate, solid, five varicose, coarsely ribbed and cancellated on the varices, whorls 6—7; aperture oval; peristome produced; canal only

slightly recurved ; the shell is of a pinkish-white colour, having a brown band just below the periphery ; in many specimens the region of the canal is tinged with rose pink, but this character does not appear to be always constant.

Alt. 20 millim. ; diam. maj. 13. Aperture, alt. 5 millim. ; diam. maj. 3.

Hab.—Ceylon.

This species appears to be most nearly allied to *Murex (Ocinebra) nucula*, Reeve. from the Philippines, but differs in being much more oval in general shape and the canal being less recurved than is the case in that species ; moreover it has only five varices on the body-whorl whereas in *M. nucula* there are six.

***Coralliophila dissimulans*, n. sp.**

Pl. vii, figs. 5, 6.

Shell conical, exteriorly white ; whorls 5—6, obliquely ribbed, the ribs in places being raised into tubercles ; suture impressed ; aperture ovate ; columella somewhat curved, tinged with pinkish purple ; canal short and curved ; peristome thin, erect ; interior of shell painted with a chestnut coloured band below the periphery and ending abruptly about two millimetres from the edge of the peristome.

Alt. 9 millim. ; diam. maj. 6.5. Aperture, alt. 4.5 millim. ; diam. 1.5.

Hab.—Ceylon.

***Mucronalia birtsi*, n. sp.**

Pl. vii, figs. 7, 8.

Shell fusiform, rather attenuated, smooth, polished, semi-transparent white ; whorls 9, convex, the apex strongly mucronated ; suture slightly channelled ; aperture inversely auriform ; columella twisted ; peristome simple.

Alt. 12.5 millim. ; diam. maj. 5. Aperture, alt. 4 millim. ; diam. 2.

Hab.—Ceylon.

This species appears to be somewhat closely allied to *M. philippinarum*, Sby., but is easily distinguished from that species by its more elongate form, the more transparent texture of the shell, and by the presence of the channelled suture which is not noticeable in *M. philippinarum*.

***Styloptygma lacteola*, n. sp.**

Pl. vi, figs. 9, 10.

Shell attenuate, fusiform, polished, striated with lines of growth transparent white, encircled with an opaque milky-white band below the suture ; whorls 9—10, slightly convex, and flattened above, giving the impressed suture an almost channelled appearance ; columella arched ; aperture obliquely ovate ; peristome simple.

Alt. 9 millim. ; diam. maj. 2. Aperture, alt. 2 millim. ; diam. maj. 1

Hab.—Galle, Ceylon.

The apical whorls in many of the specimens examined are tinged with bright pink, but as this is not apparent in all, it is probably caused by the presence of decaying portions of the animal showing through the somewhat transparent shell.

***Mactra delicatula*, n. sp.**

Pl. vi, fig. 11.

Shell triangular, rather oblique, thin, equilateral, somewhat flattened, greyish-white tinged with purple deepening towards the umbonal region, striated with lines of growth, these being rather irregular anteriorly; anterior side rounded into a sharp keel; posterior end flattened, sculptured with fine striae giving a silky appearance, and produced to an obtuse angle.

Alt. 21.5 millim.; length 25.

Hab.—Ceylon

***M. delicatula* var. *nivea*, n. var.**

Pl. vi, fig. 12.

Shell rather smaller, somewhat more lightly striate, pure white except for a very slight tinge of purple on the umbones.

Alt. 17 millim.; length 20.5.

Hab.—Ceylon.

***Mactra taprobanensis*, n. sp.**

Pl. vii, fig. 9.

Shell, ovate, convex, smooth, white painted with pale brown rays of irregular breadth; umbones brownish purple, small; anterior end produced, rounded, posterior end obtusely angled; interior sometimes pale brownish purple, sometimes white tinged with pale brown.

Alt. 7.5 millim.; length 10.5.

Hab.—Ceylon.

EXPLANATION OF PLATES.

Plate vi.

- Figs. 1, 2. *Thala ceylanica*, n. sp.
 Figs. 3, 4. *Nassa (Phrontis) siva*, n. sp.
 Figs. 5, 6. *Nassa (Phrontis) gangetica*,
 n. sp.
 Figs. 7, 8. *Murex (Ocinebra) sykesi*,
 n. sp.

- Figs. 9, 10. *Styloptygma lacteola*, n. sp.
 Fig. 11. *Mactra delicatula*, n. sp.
 Fig. 12. *Mactra delicatula* var.
 nivea, n. var.

Plate vii.

- Figs. 1, 2. *Cythara nevilliana*, n. sp.
 Figs. 3, 4. *Clathurella bulleni*, n. sp.
 Figs. 5, 6. *Coralliophila dissimulans*,
 n. sp.

- Figs. 7, 8. *Mucronalia birtsi*, n. sp.
 Fig. 9. *Mactra taprobanensis*, n. sp.

DESCRIPTIONS OF TWELVE NEW SPECIES AND ONE
VARIETY OF MARINE GASTROPODA FROM THE
PERSIAN GULF, GULF OF OMAN, AND ARABIAN SEA,
COLLECTED BY MR. F. W. TOWNSEND, 1902-1904.

BY JAMES COSMO MELVILL, M.A., F.L.S.

(Plate viii.)

I venture to offer another short instalment of descriptions of Gastropoda from the Persian Gulf and contiguous seas, all dredged by Mr. F. W. Townsend, during the past three years (1902-1904).

His last consignments come principally from Dabai, in the Persian Gulf proper, a locality that proved extremely rich, especially in Pelecypoda, though most of the Mollusca obtained had already been catalogued as found elsewhere in the neighbourhood.

But the majority of the following, it will be noted, come from the one almost inexhaustible station already descanted upon in previous papers.⁽¹⁾ This material (excepting as far as the Scaphopoda and Pelecypoda are concerned) is now thoroughly worked out, and it is hoped that a list may be eventually drawn up of all the many forms found in it, as the results are believed to have been rarely, if ever, eclipsed by any previous single haul of the dredge.

Aelis thesauraria,⁽²⁾ n. sp.

Pl. viii, fig. 1.

A testa minutissima, obtecte umbilicata, ovato-fusiformi, delicata, alba, anfractibus 9, quorum $3\frac{1}{2}$ apicales, caudati, omnino laeves, pervitrei, nitentes, caeteris apud suturas impressis, spiraliter acuticarinatis, ultimo et penultimo quatuor, antepenultimo, tribus carinis praeditis, interstitis laevibus, superficie haud nitente, apertura rotunda, peristomate paulum expanso, incrassato, super umbilicum et apud basin columellarem squarrosé effuso.

Long. 2.50, lat. 1 millim

Hab.—Gulf of Oman, lat. $24^{\circ} 58' N.$, long $56^{\circ} 54' E.$, 156 fathoms.

Very small, but wonderful in its perfection of form and sculpture. The apical whorls are almost caudate, three to four of almost uniform narrow build, quite smooth and glossy, the remainder being uniformly acutely keeled. The thickened peristome with a squarish extension of the columellar base half hides the narrow umbilicus.

In sculpture it shows kinship with *A. ascaris*.

1. Ann. & Mag. N. H., 1903, ser. vii, vol. 12, p. 289; Proc. Mal. Soc., vi, p. 51; *ibid.*, p. 159.

2. *Thesaurarius*, treasured.

Rissoina (Phosinella) phormis,⁽³⁾ n. sp.

Pl. viii, fig. 2.

R. testa parva, ovato-oblonga, alba, solidula, anfractibus 6—7, quorum apicales 2, vitrei, perlaeves, caeteris apud suturas impressis, undique densé clathratulis, interstitiis squarrosis, apertura oblique ovata, peristomate incrassato extus aspero, intus laevigato, columella obliqua, simplice.

Long. 3.50, lat. 1.50 millim

Hab.—Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms.

But few examples of a small cancellately whorled *Rissoina*, smaller than any species of the subgenus *Phosinella* that occur in the same seas. All seem dead shells, but in all probability the shell would be colourless in life.

Ethalia carneolata, Melv.

var. **rubrostrigata**, nov.

Pl. viii, fig. 3.

E. testa cum forma typica convenit, sed omnino laevigata, nitida, perobscure anfractum apud ultimum bivittata, undique longitudinaliter rubris flammis et lineis pulcherrima ornata.

Hab.—Dabai, Persian Gulf.

A very few specimens dredged in 1904 at the above locality, differing mainly in painting from the original type of this species, but so remarkable and conspicuous is this form, that it is considered worthy of being specially singled out under a varietal name. For description of *E. carneolata*, vide Mem. and Proc. Manch. Soc., No. 7, p. 19, pl. vii, figs. 25, 26.

Omphalius collingei, n. sp.

Pl. viii, fig. 4.

O. testa crassa, mediocri, conica, nigrobrunnea, anguste et profunde umbilicata, anfractibus 6, quorum apicales $1\frac{1}{2}$ laeves, informes, vitrei, caeteris spiraliter granocostatis, costis ad regionem anfractuum superiorem juxta suturas duabus praecipue majoribus nodulorum ordinibus decoratis, nodulis nitidis, rotundis, laevibus, infra, antepenultimo et penultimo binis, ultimo tribus gemmarum ordinibus usque ad peripheriam praeditis, carina peripheriali crassa, ordine noduloso duplicato, regione basali, circa umbilicum sex ordinibus nodulorum parvis, symmetricis, aequidistantibus, apertura trapezoide intus margaritacea, labro angulato, area columellari infra umbilicum bi vel tricalloso, callo albo, nitente.

Alt. 15, diam. 16 millim.

Remarkable in its resemblance to certain South American *Omphalii*, e.g. *O. 4-carinatus* and *4-costatus*, Wood, of which it is the Eastern exponent. It may be distinguished by its blackish-brown colour, thickened substance, and neat concatenation of variously sized rows of spiral noded gemmae, the

3. *Poppòs*, a basket.

larger rows just below the sutures, and towards the centre of the whorls, and likewise very much expressed in thickness with doubled rows of nodules, at the periphery on the last whorl. At the base, concentrically around the umbilicus are spirally ranged six uniform rows of small nodules.

I venture to dedicate this species to Mr. W. E. Collinge, as a very slight mark of esteem and appreciation of his unwearied labours in the cause of Malacology.

Since describing the above, another specimen has come to hand, from a second station in the Persian Gulf, through the medium of Miss M. Lebour.

***Turritella illustris*, n. sp.**

Pl. viii, fig. 5.

T. testa gracili, attenuata, delicata, alba, violaceotincta, vel pallidissime brunnea longitudinaliter indistinctis flammis decorata, anfractibus 17, quorum apicalis parvus, laevis, caeteris apud suturas multum impressis, spiralite acuticarinatis et tornatis, carinis irregularibus, majoribus cum minoribus alternantibus, anfractus apud supernos 5, tribus ultimis 7, praeditis, apertura ovato-trapezoide, labro tenui, paulum ad basim effuso, columella paulum incrassata.

Long. 2.25, lat. .55 unc.

Hab.—Dabai, Persian Gulf.

An elegant species, its nearest congeners being firstly *T. flammulata*, Kiener, from West Africa, which it resembles in its spiral ornamentation, and likewise, to some degree, in the pale flame-like blotches on, especially the upper, whorls: this is however, a more delicately moulded shell. And also to *T. fultoni*, Melv., also from the Persian Gulf; it bears a close resemblance, but differs in the more irregular carinations, pale colouration, and the spiral blotches, from its congener, which is always unicolorous white.

To Mr. Edgar Smith I am indebted for pointing out the salient characteristics of this species.

***Eulimella aeaea*,⁽⁴⁾ n. sp.**

Pl. viii, fig. 8.

E. testa gracillima, attenuata, irregulari, alba, laevi, parum nitida, anfractibus ad 8, quorum apicalis ipse externe revolutus et inversus, huic proximo paulum abnormi et irregulari, caeteris laevibus, ad suturas rotunde impressis, apertura oblonga, labro ad basim paulum effuso, columella fere recta.

Long. 4, lat. 1.50 millim., sp. maj.

„ 2, „ 1 „ sp. min.

An abnormally whorled and formed shell, most akin, so far as the inhabitants of the Persian Gulf are concerned, to *E. gelrosica*, Melv., but the revolute apical whorl is more strongly developed, and the surface perfectly smooth throughout, with no sign of spiral striation. The smallest example before me has the mouth in the greater state of perfection, this exhibiting the normal Eulimelloid character.

4. *Aeacus*, magical or abnormal.

Odostomia dorica,⁽⁵⁾ n. sp.

Pl. viii, fig. 9.

O. testa ovato-fusiformi. solidula, crassa, alba, anfractibus 7, quorum apicales 2 heterostrophii, vitrei, excavati, laeves, caeteris apud suturas canalieulatis, gradatis, duobus supernis longitudinaliter undique multicostulatis, costulis arctis, tribus ultimis laevibus, apertura fere rotunda, intus spiraliter striata, labro ad basim crassiore, plica columellari forti.

Long. 4, lat 2 millim.

Hab.—Persian Gulf, Maskat, 15 fathoms.

A solid incrassate species, somewhat rude in build, columella very strongly once plaited, whorls very excavate at the sutures, scalate, the apex glassy and heterostrophe. while the two or three next uppermost whorls exhibit longitudinal riblets, the remaining whorls being quite smooth.

Oscilla faceta, n. sp.

Pl. viii, fig. 10.

O. testa pergracili, angusta, alba, delicata, anfractibus 8—9, quorum 2 apicales, heterostrophii, vitrei, laeves, caeteris arcte spiraliter acuticarinatis et et tornatis, carinis duabus apud supernos, tribus apud antepenultimum et penultimum, ultimo anfractu ad sex carinas, superficie interstitiali laevigata vel obscure sub lente alveata, apertura ovato-oblonga, labro tenui, columella fortiter uniplicata.

Long. 3.50, lat. 1.50 millim., sp. max.

,, 3 ,, 1 ,, sp. min.

Hab.—Gulf of Oman. Lat. 24° 58' N, long. 56° 54' E., 156 fathoms.

At first deemed an attenuate variety of *O. imilica*, Melv.,⁽⁶⁾ a not infrequent species in these seas, this proposed new form differs in its far more graceful and uniformly narrowed contour, more oval aperture, and stronger columellar plica. Were it not for the presence of this last feature, indeed, it might be considered a *Cingulina*, near *C. isseli*, Tryon, which is very abundant in many parts of the North Arabian Sea. *Irawadlia trochlearis*, Gould, a Rissoid, likewise has a strange superficial resemblance to this alliance of *Pyramidellidae* in these seas, as we have already mentioned.⁽⁷⁾

Oscilla jocosa, n. sp.

Pl. viii, fig. 11.

O. testa minuta, ovato-conica, alba, anfractibus 5—6, quorum 2 apicales heterostrophii, vitrei, in proportionem magni, caeteris tri-, ultimo anfractu sex vel septem carinulatis, carinis paullum obtusis, superficie interstitiali sub lente

5. *Doricus*, from its severely classic build.

6. Proc. Mal. Soc. Lond., vol. ii, p. 112, pl. viii, f. 5.

7. Proc. Zool. Soc., 1901, pt. II, p. 369.

lepidæ alveatæ, ultimo ad peripheriam subangulato, apertura ovato-rotunda, labro tenui, angulata, columella uniplicata.

Long. 2, lat. .75 millim.

Hab.—Gulf of Oman. Lat. $24^{\circ} 58' N.$, long $56^{\circ} 54' E.$, 156 fathoms.

The smallest by far of the four *Oscillæ* yet detected as occurring in this region, and of which very few specimens have come to light. It appears mature, the angle at the periphery alone will distinguish it from its congeners.

Mumiola carbæsea,⁽⁸⁾ n. sp.,

Pl. viii, fig. 12.

M. testa ovato-oblonga, parum perforata, delicata, albo-lactea, papyracea, anfractibus 6, quorum $1\frac{1}{2}$ apicales, globulosi, vitrei perlaeves, apice ipso depresso, caeteris gradatulis, undique tenui costatis, costis fere rectis, interstitiis arctissime spiraliter liris, costis ultimum apud anfractum numero circiter 18, interdum ad basim fere evanidis, apertura ovata, labro tenui, columella simplice, paullum incrassata.

Long. 3, lat. 1.30 millim.

Allied to *M. spirata*, Ad., found also in the Arabian Sea; but its gradate whorls, depressed globular apex, delicate ribs, and oval mouth with simple unplaited columella, differentiate this species from its congeners.

Eulima (Subularia) hypolysina, n. sp.

Pl. viii, fig. 13.

E. testa vitrea, aciculata, per-attenuata, delicatissima, anfractibus 8—9, undique albo-hyalinis, laevissimis, politis, ad suturas impressis, tumidulis, lateribus infra fere rectis, ultimo interdum obscure spiraliter rufozonulato, paullum producto, apertura anguste oblonga, labro superne, juxta suturas, sinuato.

Long. 3 50, lat. 1 millim.

Hab.—Gulf of Oman. Lat. $24^{\circ} 58' N.$, long $56^{\circ} 54' E.$, 156 fathoms.

This narrow, hyaline little species, of extreme fragility and delicacy, is, as pointed out to me first by Mr. E. R. Sykes, chiefly remarkable for the rounding off, and consequent sinuate appearance of the thin, flexuous and slightly effuse outer lip, as it approaches the suture. In this respect, though not to so great an extent, it assimilates the terrestrial *Hypolysia florentiae*, M. and P., from Natal, a genus allied to *Opeas*, and the specific name is proposed from that circumstance. *E. (Subularia) bivittata*, H. & A. Ad., occurring most plentifully with it, at no stage of its existence presents the same characteristics.

8. *Cabasus*, white sail-cloth, from the papyraceous texture.

Mangilia posidonia,⁽⁹⁾ n. sp.

Pl. viii, fig. 14.

M. testa minuta, breviter fusiformi, solidiuscula, alba, angulifera, anfractibus 8, quorum $2\frac{1}{2}$ inconspicui, vitrei, laeves, apicales, caeteris apud suturas multum impressis, longitudinaliter paucicostatis, costis crassis, undique spiraliter angulato-liratis, ultimo anfractu octo liris praedito, penultimo, simul ac antepenultimo tribus. apertura anguste oblonga, labro incrassato sinu indistincto sed lato, haud profundo, columella simplice.

Long. 5, lat. 2 millim.

Hab.—Gulf of Oman. Lat. $24^{\circ} 58' N.$, long. $56^{\circ} 54' E.$, 156 fathoms.

A not infrequent species in dredged shell sand from the above locality, its nearest congener being *M. adamantina*, Melv.,⁽¹⁰⁾ a more squarely formed *Mangilia*, with distinctly larger, globular, vitreous apical whorls.

Daphnella eulimenes,⁽¹¹⁾ n. sp.

Pl. viii, fig. 15.

D. testa parva, eleganter fusiformi, alba, delicata, anfractibus 7—8, quorum apicales decussatuli, caeteris leniter supra versus suturas angulatis, arcte sed irregulariter cancellatis interstitiis plus minus quadratulis, apertura oblonga, labro incrassato, sinu patulo sed nequaquam profundo, columella fere recta paullum apud basim producto.

Long. 6, lat. 2 millim.

Hab.—Gulf of Oman. Lat. $24^{\circ} 58' N.$, long. $56^{\circ} 58' E.$, 156 fathoms.

Of the same alliance as *D. nereidum* and *D. amphitrites*, M. & S., but more gracefully formed, and gently slopingly angled below the sutures. Very rare at the above locality.

* * * *

An opportunity is here taken of figuring two species from the Persian Gulf region, viz.,

Mathilda carystia (Fig. 7.).

Solarium admirandum (Fig. 6).

Both were described in Ann and Mag. N. H., ser. vii, pp. 221—223, but owing to exigencies of space, have been, till now, left unportrayed.

9. *Poseidon*, Neptune.

10. Proc. Mal. Soc., vol. vi, pt. III, p. 165, pl. x, fig. 18.

11. *Εὐλίμενη*—a Nereid.

EXPLANATION OF PLATE VIII.

- Fig. 1. *Aclis thesauraria*, n. sp.
 Fig. 2. *Rissoina phormis*, n. sp.
 Fig. 3. *Ethalia carneolata*, Melv. var. *rubrostrigata*, n. var.
 Fig. 4. *Omphalius collingci*, n. sp.
 Fig. 5. *Turritella illustris*, n. sp.
 Fig. 6. *Solarium (Torinia) admirandum*, M. & S.
 Fig. 7. *Mathilda carystia*, M. & S.
 Fig. 8. *Eulimella acaea*, n. sp.
 Fig. 9. *Odostomia dorica*, n. sp.
 Fig. 10. *Oscilla faceta*, n. sp.
 Fig. 11. *Oscilla jocosca*, n. sp.
 Fig. 12. *Mumiola carbasea*, n. sp.
 Fig. 13. *Eulima (Subularia) hypolysina*, n. sp.
 Fig. 14. *Mangilia posidonia*, n. sp.
 Fig. 15. *Daphnella eulimenes*, n. sp.
 Fig. 16. *Mitra (Callithea) stephanucha*, Melv.
 Fig. 17. " " " var. *astephana*, n. var.

NOTE ON MITRA STEPHANUCHA, MELV., WITH DESCRIPTION OF A PROPOSED NEW VARIETY.

BY JAMES COSMO MELVILL, M.A., F.L.S.

(Plate viii, figs. 16, 17.)

SINCE December 1896, when the first examples of this fine mollusc were described, it has been frequently dredged, and is now fairly generally to be found in collections.

The largest specimen we have seen, now figured, came from the neighbourhood of Muscat, in 1901 (this being the original and central habitat for the species), and measures longitudinally 45 as against 42 millimetres in the type. This individual is of a warm and cinereous-brown. The whorls are at least 15 in number, the actual apex not being quite perfect, while the spiral row of strong echinulate coronals in the upper part of the longitudinal ribs is extremely well developed. Below these, only traces of the usual transverse interrupted dark line, so conspicuous as a rule, exist, and this is followed by a plain grey and somewhat indistinct spiral band.

As a contrast to this, a remarkable form has been quite recently dredged in the locality given below, and as it possesses so many points of similarity to *M. stephanucha* it is the wisest course to deem it a marked variety, at all events till more specimens come to hand.

I therefore characterise it thus :

Mitra (Costellaria) stephanucha, Melv.

var. **astephana**,⁽¹²⁾ nov.

Shell in general form and coloration as in the type, but much smaller, 11—12 whorled, perhaps not quite full grown, the $2\frac{1}{2}$ apical, glassy pale brown, the rest longitudinally ribbed. ribs shining, smooth. number on the body whorl 13 as against 10—11 in the normal form, when mature, upper whorls interstitially spirally punctately sulcate, less deeply, but still conspicuously on the lower whorls, there being a grey central zone at the centre of the basal, as in the type, with interrupted spiral dark line, between the ribs on the five last whorls. The echinate and acutely-noduled coronal, on the other hand, round the upper portion of the ribs is well nigh or quite obsolete, giving a perfectly different character to the facies of this new variety, proposed from this circumstance, to be called *astephana*. Indeed, it seems comparable with such a species as *M. (Costellaria) nodilgrata*, A. Ad. from the Philippines. I would add, that Messrs. Sowerby & Fulton, in their last issued elaborate catalogue of Mollusca (April, 1903, p. 18) classify *M. stephanucha* as a *Callithea*, in which subgenus *M. stigmataria* and *sanguisuga* are placed. The variety just described certainly bears a relationship to these latter, and we are not sure that *Callithea* does not therefore suit the species better than *Costellaria* : but the two sub-divisions run very closely together, and are not well defined.

Long 20, lat. 6.50 millim.

Hab.—Gulf of Oman. Lat $26^{\circ} 6' N.$, long. $56^{\circ} 53' E.$, 15 fathoms.

12. 'Λδτέφάνος, without a coronal.

ON SOME NON-MARINE SHELLS FROM THE AUSTRO- AND INDO-MALAYAN REGIONS.

By E. R. SYKES, B.A., F.L.S.

(Plate ix.)

THE forms dealt with in the following paper have come to me from several sources, mainly however, from Herr Fruhstorfer.

Thanks to the kindness of Mr. Edgar Smith, to whom I owe many thanks for his unfailing help, I have also had the advantage of seeing a series in the possession of the British Museum.

All the actual "types" are in my own collection.

***Trochomorpha gulielmi*, n. sp.**

Pl. ix, figs. 11, 12.

Shell widely and openly umbilicate, depressed conoid, thin, horn colour; sculpture well-marked lines of growth, cut, on the lower surface, by numerous, close-set, microscopic spirals; suture well-marked; whorls $6\frac{1}{2}$, regularly increasing, plano-convex, the last whorl not descending, with an acutely angled periphery, base moderately inflated; mouth subquadrate, lip thin but slightly incrassated on the columellar margin.

Diam. max. 35; alt. (from apex to base of last whorl in front) 8; diam. max. of mouth 15 millim.

Hab — Engano.

***Trochomorpha dautzenbergi*, n. sp.**

Pl. ix, figs. 13, 14.

Shell moderately and openly umbilicate, subdepressed conoid, rather thin, chestnut-brown; sculpture lines of growth, obscurely marked on the base by traces of microscopic spirals; whorls $6\frac{1}{2}$, regularly increasing, flattened, the last whorl not descending and a trifle concave just above the very acute angled periphery, base flattened but a little inflated; mouth subquadrate, lip thin but slightly incrassated on the columellar margin.

Diam. max. 31; alt. (from apex to base of last whorl in front) 7.8; diam. max. of mouth 13 millim.

Hab. — Engano.

These two handsome forms may be separated by the following characters. In *T. gulielmi* the shell is larger, lighter in colour, more depressed, and the whorls are slightly more swollen, and there is an absence of the concavity just above the periphery on the last whorl. The spiral sculpture on the base is also more marked, and the base itself is a little more swollen. I have adopted the names given to them in MS. by Herr Fruhstorfer,

Albersia waigiouensis, n. sp.

Pl. ix, fig. 16.

The shell now under consideration appears to be widely distributed in collections under the name of *A. granulata*, Q. & G., and perhaps the most serviceable method will be to diagnose it by comparison with that species.

Shell differing from *A. granulata* in the following respects: shell more depressed in proportion to the width; colour a little darker and a white zone is present below the dark encircling band, with indications of another zone above; sculpture consisting of a very large number of minute spirals which, cutting the lines of growth produce the effect of microscopic granulation, this marking gradually fades out towards the apex, which is almost smooth; contrasted with *A. granulata* the shell differs in the presence of the dense spirals and the absence of the coarse granulation on the last whorl; the mouth in the present species is twisted at the columellar junction and has an obsolete tubercle.

Diam. max. 47 millim.

The habitat is Waigiou, and I believe all the records of *A. granulata* from the Island belong to the present species, and not to the true *A. granulata* whose habitat is Port Dorey, New Guinea.

Planispira (Vulnus, n. sect.) endoptycha, Martens.var. **depressa**, n. var.

Shell somewhat more flattened.

Hab —Waigiou.

This species was described by von Martens as a *Helix* from Batjan, Mareh, and Ternate; I have a typical specimen said to have come from Obi, and a more depressed form from Waigiou. Whether the *Dorcasia compta* of Henry Adams really belongs here, as has been suggested, it is hard to say; the type does not appear to be in the British Museum. The species is placed by Mr. Pilsbry under the genus *Planispira* in a separate group with *P. porcellana*, Grateloup. *P. endoptycha* appears to me to be well worthy of a separate sectional name, being characterised by a thin deciduous periostracum, and the remarkable indentations on the last whorl at the periphery and also on the base, but, apart from these characters resembling *Cristigibba*. To this group *P. porcellana*, and *Helix infracta*, Mrtns., probably also belong. *Vulnus* also recalls the Costa Rican *Averellia macneili*, Crosse.

Planispira (Cristigibba) gebiensis, n. sp.

Pl. ix, figs. 7, 8.

Shell moderately umbilicate, large, almost flat, slightly gibbous, crest behind the lip small, closely covered with a hairy periostracum, lines of growth obscure: whorls 5 (?), the apex broken; colour in general dark-brown on the last whorl, becoming lighter on the earlier whorls, with two white zones just

above the periphery, the lower being the broader, and a third white zone at the suture, noticeable for a whorl and a half from the mouth; mouth broadly ovate, large, lip well expanded, and slightly reflected on the outer margin, more noticeably so on the columellar margin and at the base, the external colouring of the shell is seen inside the mouth, and the colouring is produced to the edge of the lip.

Diam. max. 30; alt. (to base of lip) 12 millim.

Var. *a*. Similar to type, but the crest stronger, the colour a pale straw yellow with a white zone just above the periphery and narrower brown zone just below, with indications of another white zone just above this and at the suture; periostracum a little more noticeable.

Diam. max. 28; alt. (to base of lip) 12 millim.

Hab.—Gebi Island.

***Planispira (Cristigibba) fruhstorferi*, n. sp.**

Pl. ix, figs. 9, 10.

Shell almost flat, horn-brown, openly umbilicated; sculpture well-marked lines of growth and a number of closely-set, small, pits, resembling the hair-scar markings seen on species of *Albersia*, and showing that when alive the shell is clothed with a deciduous hairy periostracum; whorls $4\frac{1}{2}$ —5, convex, and separated by a deep suture, the last whorl is swollen and has a well-marked crest behind the outer lip; mouth descending above, ovate, with a darker brown marking just inside, lip whitish-horn colour, lightly incrassate and subreflexed, a very thin callus joining the margins.

Diam. max 13.8; alt 6.5 millim

Hab —Obi.

A small form, whose most striking characters are its uniform brown colour and its sculpture.

***Obba subgranulata*, n. sp.**

Pl. ix, figs. 5, 6.

Shell perspectivevely umbilicated. depressed, with a very acute peripheral keel; pale brown, with two chestnut bands above the periphery and two below; those nearest the periphery being by far the wider; protoconch light chestnut; smooth, save for radiating lines, the residue of the shell minutely irregularly granulate, with a few scattered hairs on the last whorl, and some wrinkles behind the lip; whorls $4\frac{1}{2}$ —5. flattened, the last whorl much descending at the mouth and somewhat compressed; aperture very oblique, outer margin acutely angled, lip moderately thick, expanded, reflected, white, with a fairly thick callus joining the margins.

Alt. 10; diam. max. 27 millim.

Hab.—Batjan.

Recalling *O. marginata*, Müll., but differing in the sculpture, compression of the last whorl, shape of the spire, etc. From *O. kobeltiana*, Pfr., which it appears to resemble in sculpture, the general shape, descending last whorl, etc., should suffice to distinguish the present shell. I have seen two specimens, agreeing entirely except in size. It is always difficult to say whether a sculpture of the nature of that found on the present shell is formed by close-set pits or real granules.

***Papuina ecolorata*, n. sp.**

Pl. ix, fig. 2.

Shell trochiform, umbilicate, thin, transparent, white faintly tinged with pale yellow, protoconch large, polished, smooth, the residue of the shell lightly marked by growth lines and, very obscurely, subgranulose; whorls $5\frac{1}{2}$ —6, the earlier ones somewhat convex, the later flattened, the last whorl strongly keeled at the periphery, flattened on the base, and somewhat compressed behind the mouth; aperture very slightly descending, subquadrate, white within, the lip at the upper edge of the outer margin is not reflected, but gradually becomes so towards the base, and the columellar margin is incrassated, well expanded and reflected over the umbilicus, half concealing it.

Alt. (to base of lip) 16; diam. max. 28 millim.

Hab.—Batjan.

Though this shell has no striking peculiarities still, as I have been unable to attach it to any form known to me, I have given it a name. Its only salient characters are the thin shell and entire absence of any colour pattern.

***Papuina semibrunnea*, n. sp.**

Pl. ix, fig. 1.

Shell umbilicate, orbicular-conoid, apex somewhat acute, fairly solid, with a thin deciduous periostracum, lines of growth moderately distinct, traces of microscopic granulation are seen, chiefly on the base; apex chestnut-brown, after about the first whorl and a half a white zone appears below the suture, gradually widening until the upper half of the last whorl is white and the lower (basal) half chestnut-brown; whorls $5\frac{1}{2}$, plano-convex, suture indistinct, the last whorl is subcarinate and descends considerably at the mouth; mouth elongate oval, within it is chestnut-brown with white zones at the periphery and below the suture, lip well expanded and slightly reflected, chestnut-brown marked with white just below the insertion of the columella, columellar margin slanting, well reflected and almost covering the umbilicus.

Alt. (to base of lip) 15; diam. max. 20 millim.

Hab.—Gebi Island,

***Papuina lanceolata*, Pfr.**var. ***pulehrizona*, n. var.**

Shell similar in shape to the typical form, but a trifle more elevated and the lower margin of the peristome a little more curved. Colour pattern of the base precisely as in the type, but there is a broad zone of a chestnut colour above the periphery leaving a narrow white zone both above and below it, the upper white zone being seen on earlier whorls.

Hab —Obi.

I think this is only a colour mutation, but as seen from above, it looks quite a distinct species. My specimen is not quite so beaked as the typical form, but this is probably not a constant character.

***Perrieria canefriana*, n. sp.**

Pl. ix, figs. 3, 4.

Shell sinistral, spire elongate and gradually tapering towards the apex, truncate, uniform dark chestnut brown in colour, somewhat polished; sculpture well marked lines of growth; whorls remaining 7, plano-convex, regularly increasing to the last whorl, very little, if at all, ascending in front; aperture somewhat pyriform, dusky brown within, peristome whitish, continuous, somewhat thickened, the outer margin a little expanded, and the columella rather twisted and truncate.

Alt. 2.45; diam. max. 6.4; alt. apert. 7.3, diam. apert. 5 millim.

Hab.—Obi.

This interesting discovery extends the range of the genus, hitherto known only from New Guinea. The present species is by far the smallest of the three described and may be separated from *P. minor*, Smith, by its darker colour, more tapering form, and by the columella being more twisted. As Mr. Pilsbry states ⁽¹⁾ "the internal structure of the shell has not been investigated," I have broken up a specimen, which is now figured. The axis is much twisted, and I am unable to trace any armature upon it. I doubt if *Perrieria* belongs to the *Megaspiridae*; may it not be really referable to the *Achatinidae*?

***Leptopoma ponsonbyi*, n. sp.**

Pl. ix, fig. 15.

Shell turritid, moderately umbilicated, obscurely marked by lines of growth, microscopically densely spirally striated, with a number of small filiform carinae, five on the last whorl but one, these carinae being most numerous in the umbilical region; colour horny brown with a pale zone just below the suture, this zone being marked with irregular blackish-brown blotches; whorls $5\frac{1}{2}$, convex; aperture round, duplex, the outer portion very widely expanded except on the columellar margin, flattened, bending a trifle backwards and the surface a little wrinkled.

Alt. 8.3; diam. max. (with lip) 8 millim.

Hab —Obi.

The forms at present recorded from Obi are, *latilabre*, Martens (described as a variety of *vitreum*, Less.), *megalostoma*, Mildff., *fulgurans*, Dtz., and *altius*, Dtz. From all these the present species may be severed by its form (like *leucorrhaphæ*, Martens) and the remarkable expansion of the lip. I much doubt if *L. fulgurans* really came from Obi; I have it from the same collector as from Batjan.

It gives me special pleasure to name this shell after Mr. J. H. Ponsonby, by whose knowledge I have so often profited.

***Leptopoma leucorrhaphæ*, Martens.**

var. ***eingillus***, n. var.

Shell like a dwarf *leucorrhaphæ*, which it resembles in colour pattern, the height, however, is only 9 in place of 12 millim.; spirals more numerous and more closely-set, there being 6 instead of 5 on the last whorl but one. The habitat is Gebi in place of Dodinga, Halmahera, from which latter I have a typical specimen (coll. Doherty).

***Ameria plicaxis*, n. sp.**

Pl. ix, fig. 17.

Shell closely related to *Ameria obiana*, Rolle, but it may be at once distinguished by the shape of the spire, which in that species is very short and swollen, the upper whorls being very convex. In the present form the spire is drawn out and is of the usual "Physoid" shape: the columella has also the strong twisted fold characteristic of *A. obiana*.

Alt. 22; diam. max. 11; alt. apert. 12; lat. apert. 5.5 millim.

Hab.—Obi.

It has been suggested to me that this may be the *Physa moluccensis* of Lesson. His description is very brief and I fancy the species will prove to be unidentifiable; it must however be sought in the fauna of Amboina. The only figure I have seen purporting to represent it is that in the "Conch.-Cab," which is certainly not the present species. It may also be noted that Lesson's shell was 18 millim. in height.

EXPLANATION OF PLATE IX.

- Fig. 1. *Papuina semibrunnea*, n. sp.
- Fig. 2. *Papuina ccolorata*, n. sp.
- Figs. 3, 4. *Perricria canefriana*, n. sp.
- Figs. 5, 6. *Obba subgranulata*, n. sp.
- Figs. 7, 8. *Planispira (Cristigibba) gebiensis*, n. sp.
- Figs. 9, 10. *Planispira (Cristigibba) fruhstorferi*, n. sp.
- Figs. 11, 12. *Trochomorpha gulielmi*, n. sp.
- Figs. 13, 14. *Trochomorpha dautzenbergi*, n. sp.
- Fig. 15. *Leptopoma ponsonbyi*, n. sp.
- Fig. 16. *Albersia waigiouensis*, n. sp.
- Fig. 17. *Ameria plicaxis*, n. sp.

THE HELICOID LAND SHELLS OF ASIA. CORRECTIONS AND ADDITIONS.

BY G. K. GUDE, F.Z.S.

THANKS chiefly to the careful and painstaking scrutiny to which Mr. Ponsonby has subjected my lists of the Helicoid Land Shells of Asia in the two previous volumes of this Journal, a number of slips and inaccuracies have come to light, and I have thought it useful to tabulate these. Several new species have in the meantime been published, a list of which is appended.

From Mr. H. Rolle, of Berlin, I have lately received, with some other Turkestan shells, two species which appear never to have been described, and although he informs me he thinks they were published some years ago in the "Nachrichtsblatt der Deutschen Malakozologischen Gesellschaft." as I have been unable to trace them in this publication, I append diagnoses.

Cathaica (Eucathaica) sturanyi, Rolle, n. sp.

Shell umbilicate, depressed-conoid, opaque, pale corneous above, pearly below, slightly fuscously streaked; finely striated, decussated with excessively fine spiral lines. Spire depressed, apex obtuse but rather prominent, sutures deep. Whorls 5, convex, rounded at the periphery. Last whorl not descending in front, slightly dilated at the mouth. Aperture oblique, subcircular; margins convergent, united by a thin callus on the parietal wall. Peristome whitish, scarcely thickened; upper and outer margins straight, basal margin slightly reflected, columellar margin slightly dilated, but not impinging upon the wide umbilicus which distinctly shows half the penultimate whorl.

Diam. maj. 19.5, min. 17; alt. 11 millim.

Hab.—Osh. Prov. Ferghana, Western Turkestan.

Three specimens. Type in my collection.

The new species resembles in shape *C. middendorffi*, Gerstf., but that shell is thinner, translucent, more depressed, possesses one more whorl, and has sometimes a peripheral band, while the aperture is less rounded, and the lower margin is more reflected and straight. It is also more distinctly striated and strongly sculptured spirally.

Cathaica (Campylocathaica) hermanni, Mlldff., n. sp.

Shell narrowly umbilicated, conoid, pale fulvous above, whitish at the side and below, finely irregularly ribbed, decussated by microscopic spiral lines, which are more distinct near the aperture. Spire elevated, apex obtuse, suture impressed. Whorls 5—5¹/₂, rounded, tumid below, last whorl slightly de-

cending in front, a little shouldered above, and scarcely dilated at the mouth. Aperture subrotundate, margins approaching, united by a thin callus on the parietal wall; peristome white, slightly thickened; upper margin slightly ascending, straight, outer and lower margins reflected, columellar margin dilated overhanging the deep narrow umbilicus.

Diam maj. 13, min. 11.5; alt. 9 millim.

Hab.—Alexander Range, Issig Kul, Western Turkestan.

Three specimens Type in my collection.

Compared with *C. reftereri*, Rosen, its nearest ally, *C. hermanni* is smaller and more elevated in the spire. *C. reftereri*, moreover, has a white peripheral band, is smoother and possesses pronounced impressed spirals. Another closely allied species is *C. mesoleuca*, Mart., but that shell is still smaller, with a much narrower umbilicus, more flattened whorls and a white peripheral band.

CORRECTIONS.

VOLUME IX.

Page 7, 7th line, 1st col., delete = frilleyi, Cr. and Deb.

Page 7, 6th line, 2nd col., delete constantiae, H. Ad., and insert on page 8, between Eucathaica fasciola, Drap., and E. cardiostoma, Mdff.

Page 8, 6th line from below 1st col., delete anceyi, Mdff., and insert on page 6, between Laeocathaica filippina, Hde., and L. subsimilis, Desh.

Page 8, 4th line from below 2nd col., delete dejeana, Hde., and insert on page 6, between Laeocathaica filippina and L. anceyi, Mdff.

Page 53, 26th line, 2nd col., for Fruticicola mesoleuca, Mart., read Campylocathaica mesoleuca, Mart.

Page 100, 29th line, 1st col., for Genus Vitrea, Fitz., read genus Polita, Held.

Page 102, 33rd line, 1st col., for Vitrea aequata, Mouss., read Polita aequata, Mouss.

Page 104, 1st col., the three species placed under Vitrea transfer to Polita.

2nd line, 1st col., for patuliformis read patulaeformis.

7th line from below, 2nd col., for lenkoreana read lenkoranea.

Page 112, 9th line, for Vitrea read Polita.

22nd line, 1st col., for Genus Vitrea, Fitz., read Genus Polita, Held.

25th line, 1st col., for cyprea read cypria.

Page 115, 3rd line from below, 1st col., delete v. anprazonata, Mouss.

Page 116, 6th line, 2nd col., for Mart. read Mort.

Page 117, 2nd line, 1st col., for lenkorana read lenkoranea.

Page 118, 7th line, 2nd col., for erdelli read erdellii

Page 120, 15th line, 2nd col., for asemnis, Bourg., read solida (Zglr.), Kob., = asemnis, Bourg., = ciliciana, Bourg.

Page 120, 27th line, 1st col., for Byzantium read Byzantium.

Page 121, 8th line, 1st col., for Genus Vitrea, Fitz., read Genus Polita, Held.

10th and 28th line, 2nd col., delete = *rissoana*, Pfr.

12th line 1st col., for *Retinella aequata*, Mouss., read *Polita aequata*, Mouss.

20th line, 2nd col., for *asemnno* read *asemnno*.

25th line, 1st col., for Genus *Vitrea*, Fitz., read Genus *Polita*, Held.

Page 122, 3rd line, 1st col., for Genus *Vitrea*, Fitz., read Genus *Polita*, Held.

8th line, 1st col., for *Retinella aequata*, Mouss., read *Polita aequata*, Mouss.

9th and 10th lines, 1st col., transfer *Retinella hydatina*, Rossm., and *R. sorella*, Mouss., to *Vitrea*.

17th line, 1st col., for *cyprea* read *cypria*.

Page 123, 19th line, 1st col., for *Vitrea protensa*, Fér., read *Polita protensa*, Fér.

Page 126, 22nd line, 2nd col., for *Retinella aequata*, Mouss., read *Polita aequata*, Mouss.

25th line, 2nd col., for *Retinella protensa*, Fér., read *Polita protensa*, Fér.

Page 128, 10th line from below, 1st col., for *crenophila*, Pfr., = *musculicola*, Bourg., read *musculicola*, Bourg., = *crenophila*, Pfr.

Page 129, 5th line, 2nd col., for *Borug*, read Bourg.

16th line, 1st col., delete *beilanica*, West.

18th line, 1st col., *asemnno*, Bourg., = *solida*, Zglr., read *solida*, Zglr., = *asemnno*, Bourg.

VOLUME X.

Page 9, 8th line, 1st. col., for *hupensis*, Hdc., read *hupensis*, Gredl.

Page 11, 4th line, 2nd col., for *ptychostyla*, Mts., read *ptychostyla*, Pfr.

32nd line, 1st col., for Genus *Microcystina*, Mörch., read Genus *Sesara*, Alb., and with *annamitica*, Cr. and F., place below *Kaliella bouyeri*, Cr. and F.

Page 12, 22nd line, 1st col., delete *promiscua*, Smith.

31st line, 1st col., for *Hemiplecta danae*, Pfr., read *Euplecta danae*, Pfr.

Page 13, 29th line, 1st col., for *Coneuplecta globulosa*, Mdff., read *Coneuplecta möllendorffi*, n.n. = *globulosa*, Mdff., Nachr. Bl., 1901, p. 112, not *globulosa*, Mdff., Nachr. Bl., 1900, p. 120.

Page 50, 4th line from below, 2nd col., for *Helicarion lowi*, de Morg., read *Nilgiria lowi*, de Morgan, fide Collinge.

32 line, 2nd col., for *sakayana*, de Morg., read *sakaya*, de Morg.

Page 52, under 9th line, 1st col., insert section *Trichochlorites*, Pils.

Page 55, 24th line, 1st col., delete = *cryptopila*, Mouss. in coll.

Page 56, 7th line, 2nd col., for *helicincides*, Mouss., read *helicinoides* v, *cryptopila*, Mouss.

Page 58, 24th and 25th line, 1st col., delete *kinabaluensis*, Smith and *v. pallida*, Smith, and transfer to page 56 under *Trochonanina labuanensis*, Pfr.

Page 59, 8th line, 1st col., for Genus *Macrochlamys*, Bens., read Genus *Everettia*, G.-A.

Page 62, 18th line, 1st col., for Mart., read Soul.

Page 83, 19th to 23rd lines, 1st col., *trochus*, Müll., and synonyms, *stuartiae*, Sowb., and *nemorensis*, Müll., transfer to 2nd col., under *Hemiplecta*.

Page 86, 3rd line from below, 1st col., for Genus *Microcystina*, Mörch read Genus *Lamprocystis*, Pfr.

Page 88, under 30th line, 1st col., insert section *Trichochloritis*, Pils.

Page 92, 19th line, 2nd col., for *unicolor* (Mdff.), Dautz., = *pseudolanceolata*, read *pseudolanceolata*, Dautz., = *unicolor* (Mdff.), Dautz., non Pfr.

Page 97, 9th line, 1st col., for Genus *Otesia*, H. Ad., read Genus *Coneuplecta*, Mdff.

ADDITIONS.

VOLUME IX.

Page 6, 1st col., under *Euplecta dichromatica*, Mor., insert Genus *Coneuplecta*, Mdff. *mecongana*, Mdff., Laos.

Page 7, 1st col., after 4th line *ravidula* insert *globosa*, Preston, Shan-tung.

Page 52, under Tibet add, *Euconulus fulvus*, Drap. N.E. Tibet. *Pliocathaica orithya v. conica*, Andr. Baa Valley. *P. pulveratrix v. strigillata*, Andr. Wan-saong

Page 53, under Eastern Turkestan add *Pliocathaica orithya v. unifasciata*, Andr. Kaschgar. Under Mongolia add, *Euconulus fulvus*, Drap. Tarim Basin. *Zonitoides nitidus*, Müll. Kuldja.

Page 99, after 5th line, 2nd col., *diaphora*, West., insert *krynickii*, Andr. Kopet Dagh. After 19th line, 1st col., insert *mesoleuca*, Mart. Ferghana.

Page 102, under Mesopotamia add, *Levantina michoniana*.

Page 104, under 17th line, 1st col., *Helicidae*, insert Group *Haplogona*, Genus *Pyramidula*, Fitz., *rupestris*, Drap. Schah Rud.

Page 116, under 32nd line, 2nd col., *Levantina ceratomma*, Pfr., insert *casta*, West. In 1st col., under *Zonites*, Montf., add, *anthesi*, Kob. Pergamos, and *insignis*, Naeg. Gulek, Cilicia. In 2nd col., under *Tachea atrolabiata*, Kryn., add the following varieties: *intercedens*, Ret. Batoum; *maxima*, Kob. Suchum Kaleh; *decussata*, Bttgr. Kutais; *albolabiata*, Kob.: *hyrcana*, Dohrn. Rescht, and *malleata*, Kob. Lenkoran.

Page 118, 2nd col., under *Pyramidula*, Fitz., add, *rupestris*, Drap. Gulek, Cilicia. Under *Heliomanes derbentina*, insert *millepunctata*, Bttgr.

Page 119, 1st col., under *Jacosta rozeti*, Mich., insert *subcalcarata*, Naeg. Kissik.

Page 120, under 19th line, 1st col., *atrolabiata*, Kryn., insert *v. intercedens*, Ret. Trebizond. Under 23rd line, 1st col., *aimophila*, Bourg., insert *triangula*, Naeg. Eski Schehir. Under 5th line, 2nd col., *v. taurica*, Kryn., insert *salisi*, Mab. Lebanon. Under 14th line, 2nd col., *v. anatolica*, Kob., insert *v. trojana*. Kob. Trojad, and *v. libanica*, Kob. Lebanon. Under 15th line, 2nd col., *solida*, Zglr., insert *v. ionica*, Mart Gulek. Under 22nd line, 2nd col., *pathetica*, Parr., insert *pomacella v. attalus*, Kob. Pergamos. Under 28th line, 2nd col., *issica*, Kob. and Rolle, insert *blumi*, Kob. Cilicia. Under 34th line, 2nd col., *escherichi*, Bttgr., insert *nucula v. merssinae*, Kob.

Page 122, under *Kalymnos*, after *Levantina spiriplana*, Oliv., add *v. valentini*, Kob.

Page 126, after 6th line, 1st col., *v. cypria*, Kob., insert *cornarae*, Kob.

Page 127, under *Heliomanes derbentina* insert *millepunctata*, Bttgr.

Page 129, under *Helicogena* add, *dickhauti*, Kob.? Palestine, and *pseudopomatia*, Kob. Cherkli.

VOLUME X.

Page 13, 2nd col., under *Helicarion siamensis*, Haines, insert Genus *Microparmarion*, Simr., *bruneopallescens*, Cllge., *annamica*, Cllge. = *andamanica*, Cllge. Mekong Valley.

Page 50, under Perak add, *Damayantia minima*, Cllge.

Page 52, under Nawng Chik add, *Euplecta bijuga*. Stol., *Macrochlamys splendens*. Phil., *Dyakia salangana v. martensi*, Cllge., *Hemiplecta sakaya*, de Morg., *Nilgiria lowi*, de Morg., *Ariophanta janus*, Chemn., *Parmarion malayana*, Cllge., *Trochomorpha timorensis*, Mart., *Sitala infula*, Bens.

Page 57, under 20th line, 1st col., *v. atrofusca*, Mart., insert *v. annectens*, Mart. In 2nd col., under *Damayantia*, Issel, add, *simrothi*, Cllge., *rugosa*, Cllge.; under *Parmarion*, P. Fisch., add, *shelfordi*, Cllge.; under *Collingea*, Simr., *eranna*, Cllge.

Page 58, under 7th line, 2nd col., *martensi*, Bttgr., insert *v. capistrata*, Mart. Under 16th line, 2nd col., *v. angulata*, Fult., insert *v. obliquata*, Mart. Under 34th line, 1st col., *quadrivolis*, Mart., insert *semiquadrivolis*, Mart.

Page 59, under 23rd line, 2nd col., *inquieta*, Dohrn, insert *brachystoma*, Mart. Under 29th line, 2nd col., *v. everetti*, Fult., insert *waterstraati*, Rolle, and *weyersi*, Dautz.

Page 61 2nd col., bottom of page, insert h. 2. Doat Island. Genus *Everettia*. G.-A., consul, Pfr., and *jucunda*, Pfr.

Page 90, 1st col., bottom of page, insert a. 2. Gebi. *Xesta aulica*, Pfr. *Planispira kurri*, Pfr. *Papuina unicolor*, Pfr., = *Ampelita unicolor*, Auct., *P. fallax*. Fult., and *Albersia subsphaerica*, Fult.

Page 92, after 3rd line, 2nd col., *kurri v. obiensis*, Dautz., insert Subgenus *Cristigibba*, Can. *albopicta*, Sykes.

Page 98, add to Index, Bunguran. E. l. 1. Doat Island. E. h. 2. Dwers in de Weg. D. f. Gebi. H. a. 1. Mengalun (E. f.). Roma. G. k. 2 (see Vol. X, p. 130).

NOTE.

Note on Two varieties of *Arion subfuscus*, Drap. Mr. H. Overton has recently submitted to me for identification two examples of *Arion subfuscus*, Drap., collected by him in Sutton Park, Sutton Coldfield.

The larger of the two specimens, although not quite full grown is undoubtedly referable to the variety *flagellus*, Clge., described by me in 1893 (Ann. and Mag. N. H., 1893, s. 6. vol. xii, p. 252) as *Arion flagellus*.

The smaller specimen, when alive, exhibited two dark grey lateral bands, the portion beneath being white as well as the foot-fringe and foot sole. The whole of the dorsum was a light grey; the mantle similar to the type.

WALTER E. COLLINGE.

CURRENT LITERATURE.

Pilsbry, Henry A.—Manual of Conchology, ser. ii, vol. xvii (pt. 65), pp. 1—64, pls. 1—10. Philadelphia: Academy of Natural Sciences.

With the commencement of volume xvii the genus *Achatina*, Lamarck, is dealt with. After a few notes on the distribution, parasites and nomenclature, a key to the West African species is given, and the systematic review commenced.

The following new forms are described: *A. achatina*, L. var. *monochromatica*, from Angola, and *A. occidentalis*, from Corisco Island, West Africa. *A. panthera*, Fér. var. *leucostyla*, Wasin Island, northern Zanzibar, var. *chrysoderma*, from Mauritius, and *A. fulica*, Fér. var. *coloba*.

Jones, K. H. and Preston, H. B.—List of Mollusca collected during the commission of H.M.S. "Waterwitch" in the China Seas, 1900—1903, with descriptions of new species. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 138—151, 7 figs. in text.

One hundred and seventeen species are listed of which the following are new: *Eulota globosa*, *Limnæa mars*, L. (*Gulnaria*) *whartoni*, L. (G.) *shantungensis*, L. (G.) *pettiti*, *Assimineæ norburyi*, and *Pecten (Chlamys) farreri*.

Petch, T.—The Published Records of the Land and Fresh Water Mollusca of the East Riding [of Yorkshire], with Additions. Trans. Hull Sci. and Field Nat. Club, 1904, vol. iii, pp. 121—172, pls. xii, xiii.

Mr. Petch's paper forms an admirable resumé of the work done in this particular district on the Land and Freshwater Mollusca, but it is greatly to be regretted that, at a time when malacologists are prepared to sink all petty differences as to special views on nomenclature, in order to obtain uniformity, that the old nomenclature has here been adhered to; apart from this feature, the list is admirable and reflects great credit on its author.

Sykes, E. R.—On a new species of *Amastra* from the Hawaiian Islands. Ann. and Mag. N. H., 1904 (s. 7), vol. xiv, pp. 159, 160, 2 figs.

Amastra (Kanaia) rev. n. sp., somewhat recalls in form and appearance *Helicina agglutinans*. It belongs to the group of *A. alata*, Pfr., and *A. heliciformis*, Ancy.

Eliot, C. N. E.—On the *Doris planata* of Alder & Hancock. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 180, 181.

The author has examined specimens of *Platydorís planata* from Plymouth, and finds that they have all the essential characters of the genus *Geiódoris*. Whether or not the *G. complanata*, Bergh, is specifically distinct is doubtful, but if the same, the name *planata* (A. and H., 1855) has priority. Possibly the *Platydorís planata* examined by Garstang may be distinct from those now described.

Hedley, C.—Studies on Australian Mollusca. Pt. viii. Proc. Linn. Soc. N.S.W., 1904, pp. 182—211, pls. viii—x.

The author points out that the *Coxiella confusa*, Smith, is the same as *C. badgerensis* (Johnst.) which latter name has priority, and that the *Bythinia richmondiana*, Petterd, must yield to the prior *Hydrobia petterdi*, Smith. To the same species is referred the *Pupa anodonta* of Musson and Hedley. Descriptions and figures of fourteen new species are given and one new genus *Sliva*, allied to *Rissoina* (type *S. ferruginea*, n. sp.), in addition to which many species are figured for the first time. *Lima sydneyensis* is a new name for *L. brunnea*, Hedley non Cooke.

Smith, Edgar A.—Note on *Terebra hedleyi*, Tate. Ibid., pp. 211, 212.

Mr. Smith points out that this is not a *Terebra*. The late Professor Tate stated that *Cingulina brazieri*, Angus, belonged to the genus *Terebra* and as the species-name was already in use in the latter genus, he changed it to *hedleyi*.

The author adds that he very much doubts whether this so-called species is anything more than a variety of *C. circinata*, A. Adams.

Roebuck, W. D.—Re-establishment of *Limax tenellus* as a British species. Journ. Conch., 1904, vol. ii, pp. 106—109.

All malacologists who take any interest in the Slug fauna of the British Isles will be pleased to learn that the author has satisfactorily established this slug as a member of our fauna. From the pine-woods of the Forest of Rothiemurchus, in the Vice-county of Easternness many examples have been received, also from Clackmannshire, about Inver, near Dunkeld, Perthshire, and Invercannie, near Banchory, Kincardineshire.

Hoyle, William E.—Report on the Cephalopoda. From Rpt. on Pearl Oyster Fisheries of the Gulf of Manaar. Roy. Soc. Lond., 1904.

The collection of Cephalopoda obtained by Prof. Herdman, though small, contains several novelties. The Octopods preponderate, and many are immature.

The new species are *Polypus herdmani* and *P. arborescens*. In this latter the surface presents a number of branched papillae; there are one or two over each eye, about a dozen on the back, a few on the ventral surface, and in most cases one or two on the outer aspect of each arm. The nature of these bodies is, as yet, very obscure. The possibility of their being either glandular or phosphorescent seems to be excluded by the fact that the fibrils come up to and give off a radiating tuft, whilst against a sensory function is urged the fact of the fusion of their lower portion with the surrounding tissues, and as yet no nerves have been traced to them. Possible, although it seems very doubtful, they may be parasitic.

Bartsch, Paul.—Notes on the genus *Sonorella*, with descriptions of new species. Smiths. Miscell. Coll., 1904, vol. 47, pp. 187—200, pls. xxviii—xxxiii.

The author finds that a careful examination of the nuclear whorls shows variations along several lines, and these may be utilised in grouping the species. Upon these variations he divides the genus up into four groups, viz., i. Group of *S. wolcottiana*, ii. Group of *S. hachitana*, iii. Group of *S. magdalensis*, and iv. Group of *S. fisheri*.

In the second group *S. ashmuni*, *S. nelsoni*, *S. goldmani*, *S. merrilli*, *S. dalli*, *S. mearnsi*, and *S. baileyi* are new species, with a new subspecies of the latter, *orcutti*. In the fourth group *S. fisheri* is also new.

All the species are well illustrated.

Bartsch, Paul.—A new species of *Amphidromus*. Ibid., pp. 292, 293, pl. xlv. *A. gossi*, n. sp., from Mount Kin Baloo, North Borneo, 13,000 feet.

Pallary, Paul.—Addition a la faune Malacologique du Golfe de Gabès. Journ. de Conchyl., 1904, vol. lii, pp. 212—248, pl. vii.

The author describes and figures ten new species and five subspecies from this region.

Couturier, M.—Catalogue des Coquilles Paléarctiques de la Collection Hagenmüller. Ann. Mus. d'Hist. Nat. Marseille-Zoology, 1903, T. viii, pp. 21—67.

Vayssière, A. Recherches zoologiques et anatomiques sur les Mollusques Opisthobranches ou Golfe de Marseille. Supplement. Ibid., pp. 73—108, pls. ii, iii.

Heath, Harold.—The habits of a few Solenogastres. Zool. Anz. 1904, Bd. 27, pp. 457—461.

Roebuck, W. D.—Radnorshire Slugs. Journ. Conch., 1904, vol. xi, p. 128.

Fischer, H. et Dautzenberg, Ph.—Catalogue des mollusques terres et fluviatiles de l'Indo-Chine orientale cités jusqu'à ce jour. Mission Pavie, 1904, pp. 1—61.

Fischer, H.—Remarques sur le *Columbella terpsichore*, Sow., et sur l'*Euchelus crythracensis*, Stur. Journ. de Conchyl., 1904, vol. lii, pp. 59, 60.

Dautzenberg, Ph. et Dollfus, G. F.—Études critiques sur la nomenclature avec examen des genres *Pectunculus* et *Glycimeris*, Ibid., pp. 109—122.

Vayssière, A.—Étude zoologique de l'*Archidoris stellifera*, H. von Ihering. Ibid., pp. 123—130, pl. iv.

Lamy, Edouard.—Liste des Arches conservées avec étiquettes de Lamarck dans les collections du Muséum de Paris. Ibid., pp. 132—167, pl. v.

Randles, W. B.—Some observations on the Anatomy and Affinities of the *Trochidae*. Quart. Journ. Micros. Sci., 1904, vol. 48, pp. 33—78, pls. iv.—vi.

Melville, J. Cosmo.—Descriptions of twenty-eight species of Gastropoda from the Persian Gulf, Gulf of Oman, and Arabian Sea, dredged by Mr. F. W. Townsend, of the Indo-European Telegraph Service, 1900—1904, Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 158—169, pl. x.

Melville, J. Cosmo.—*Conus coromandelicus*, Smith, its probable affinities, and systematic position in the family *Conidae*. Ibid., pp. 170—173, figs. 1, 2.

EDITOR'S NOTES.

On completing another volume, the Editor tenders his grateful thanks to all who have in any way furthered the interests of the Journal during 1904.

It is with feelings of deep regret that we learn of the death of Professor E. von Martens.

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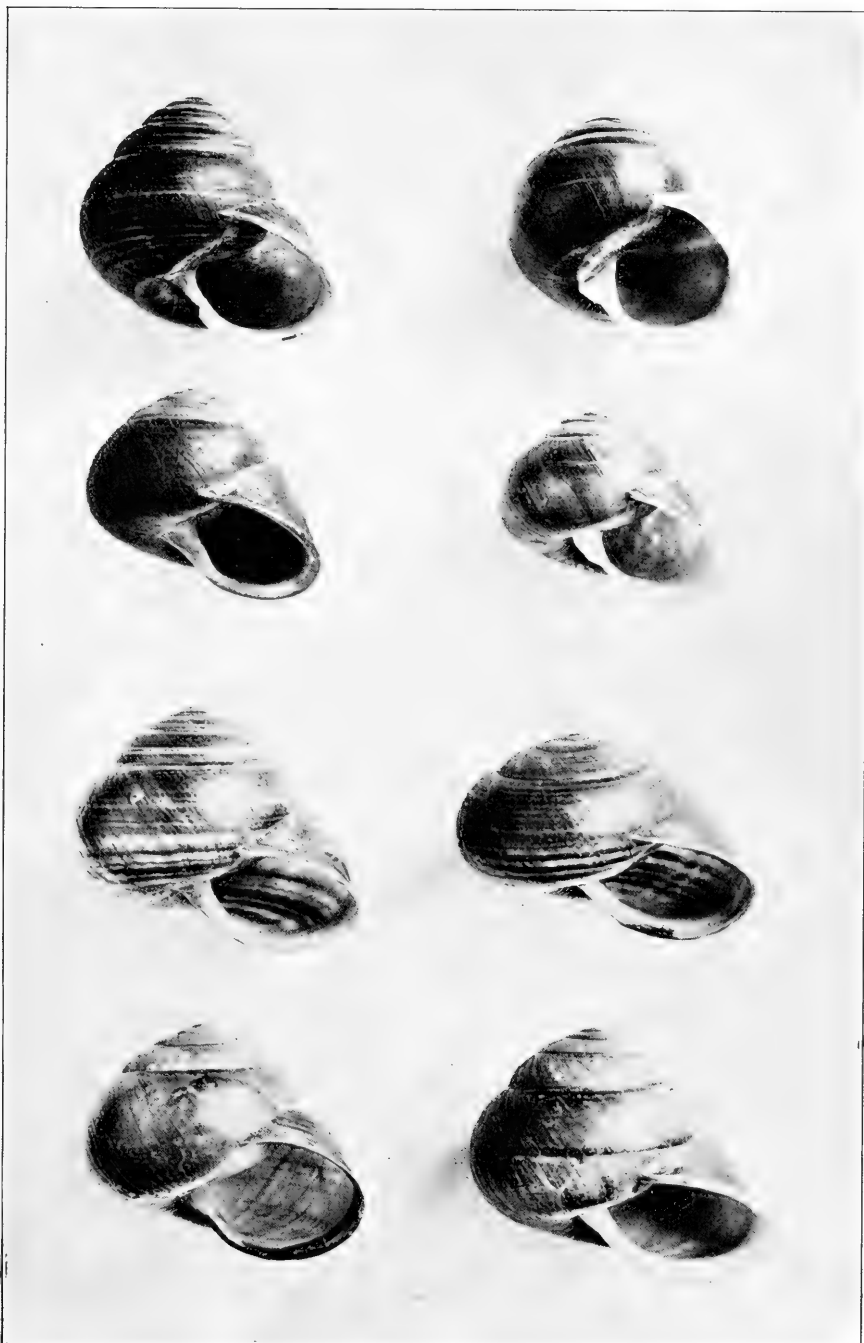


EXPLANATION OF PLATE I.

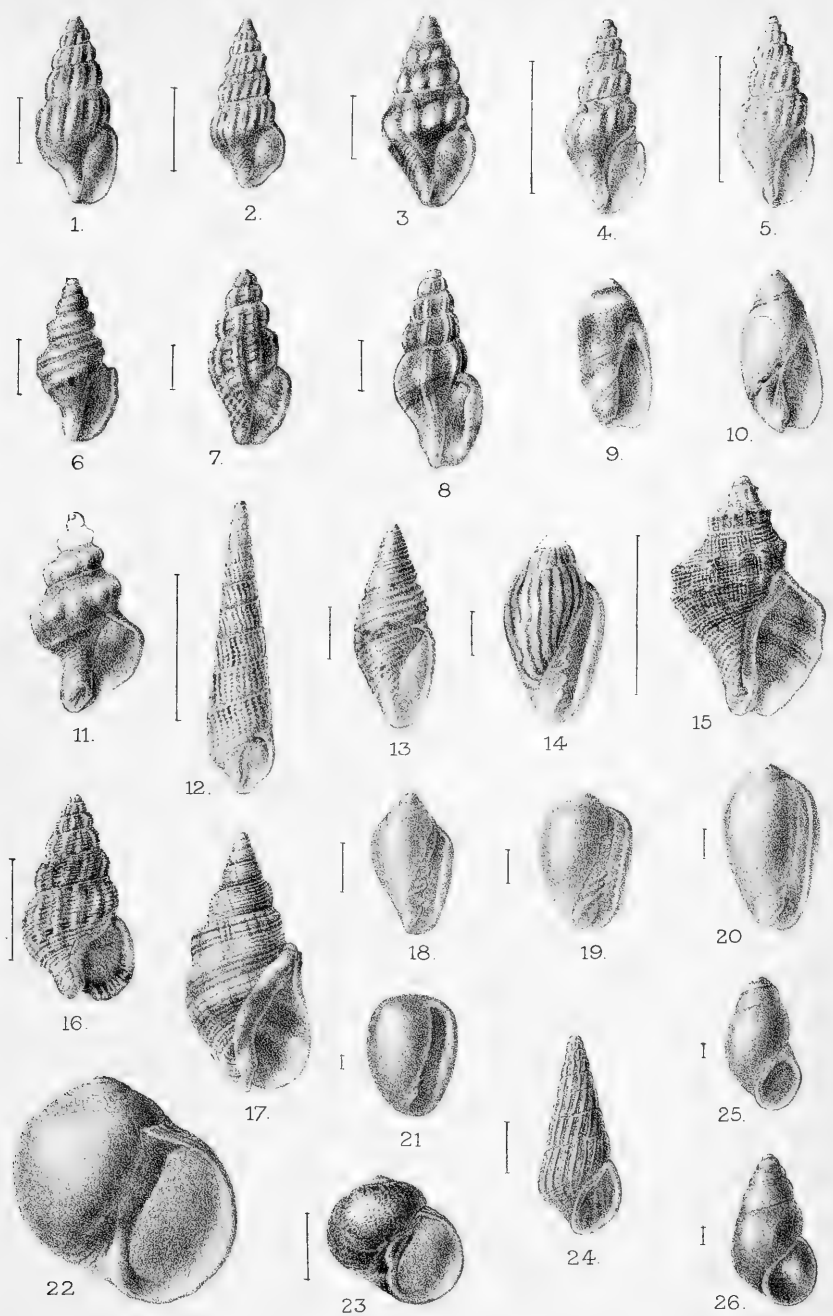
- Fig. 1. *Thersites mulgravensis*, Brazier.
 2. „ *etheridgei*, Brazier.
 3. „ *concora*, n. sp.
 4. „ *lessoni*, Pfr. var. *lutea*, n. var.
 5. „ *mulgravensis*, Brazier var. *palmensis*, Braz.
 Typical form.
 6. „ *mulgravensis*, Brazier var. *palmensis*. Braz.
 Depressed form.
 7. „ *mulgravensis*, Brazier var. *meridionalis*, Braz.
 8. „ *mulgravensis*, Brazier var. *meridionalis*, Braz.
 Banded.

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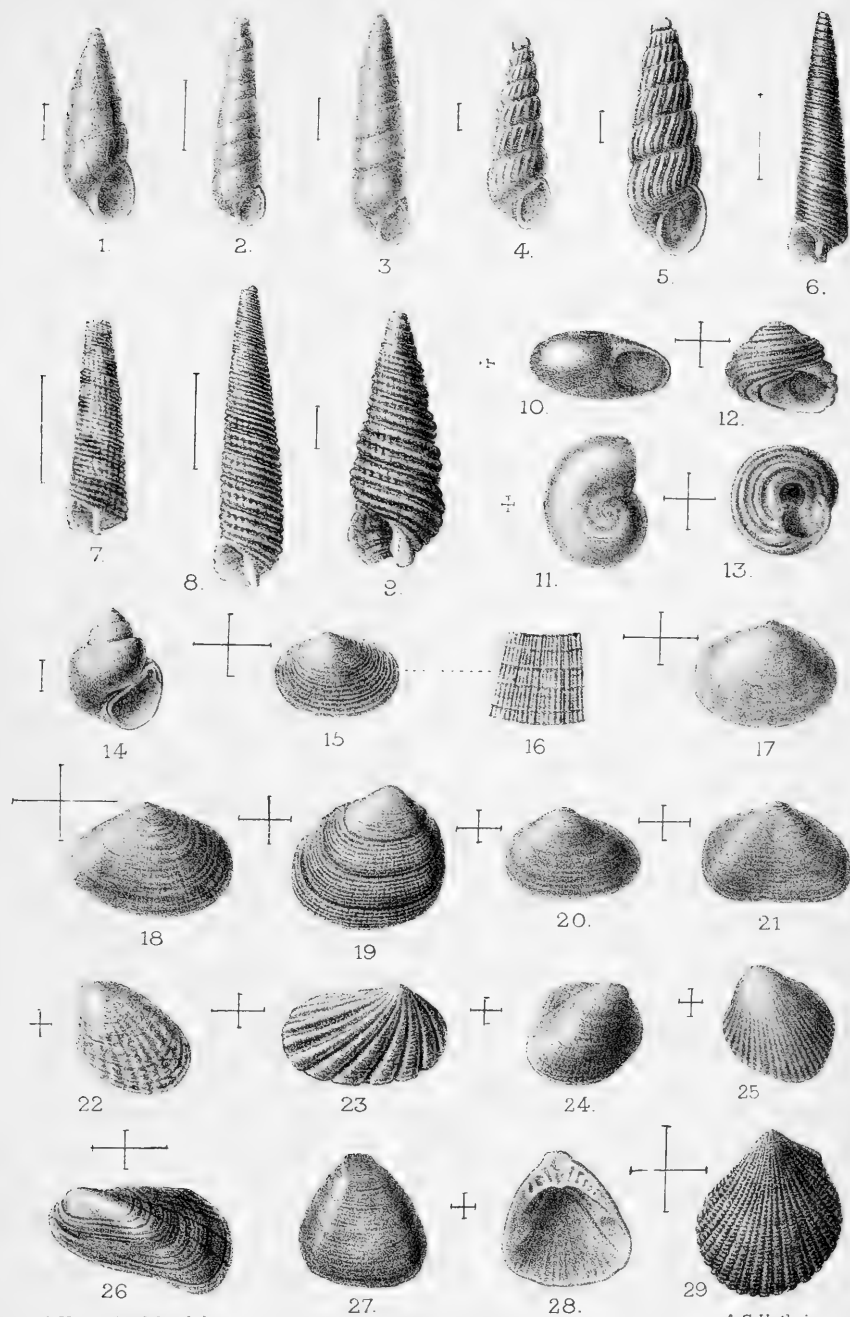


SPECIES AND VARIETIES OF THERSITES.



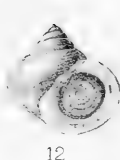
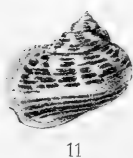
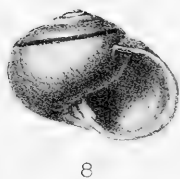
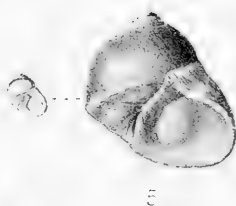
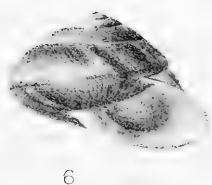
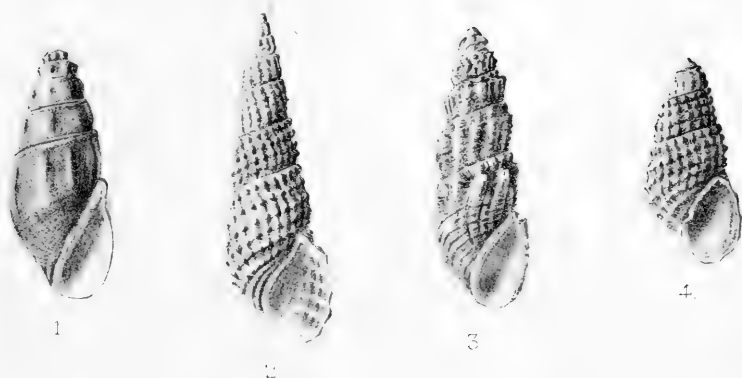
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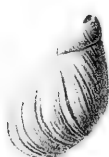
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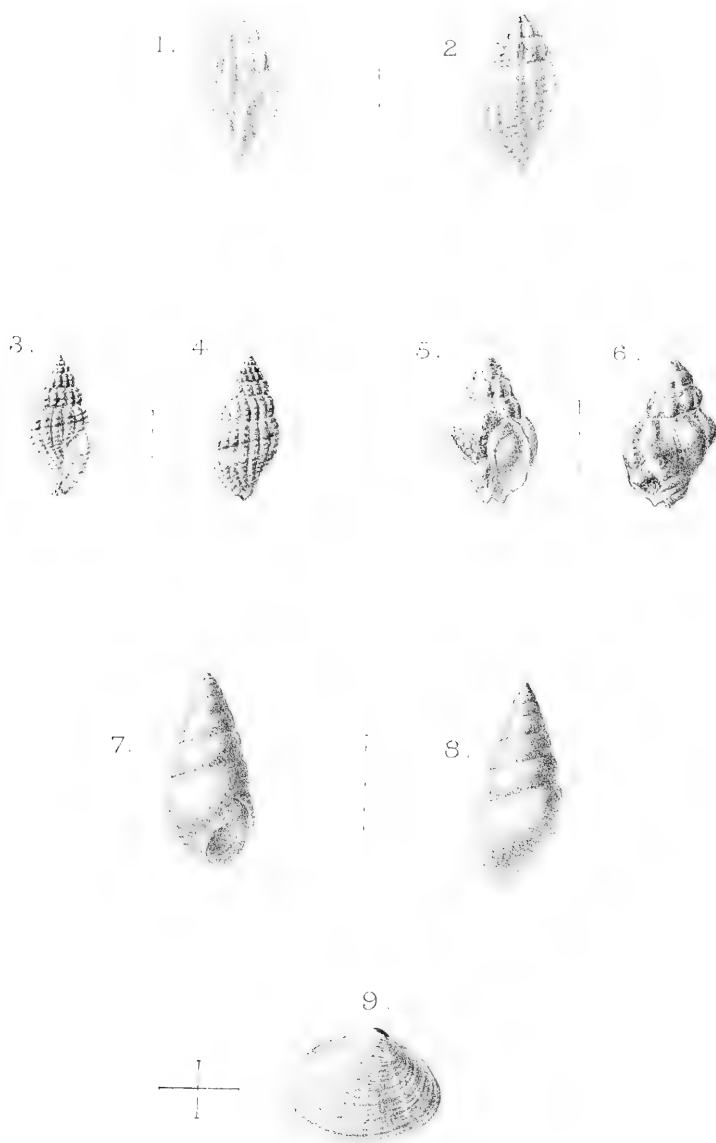
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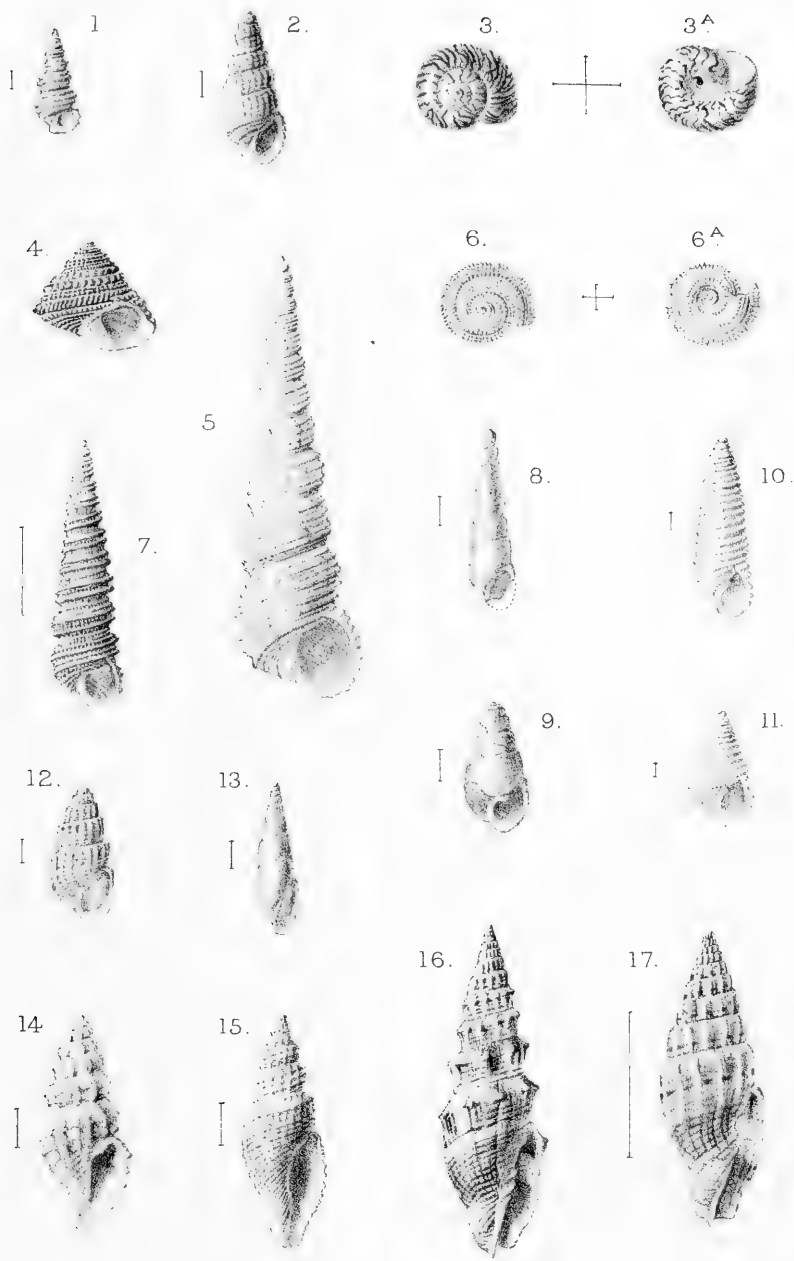


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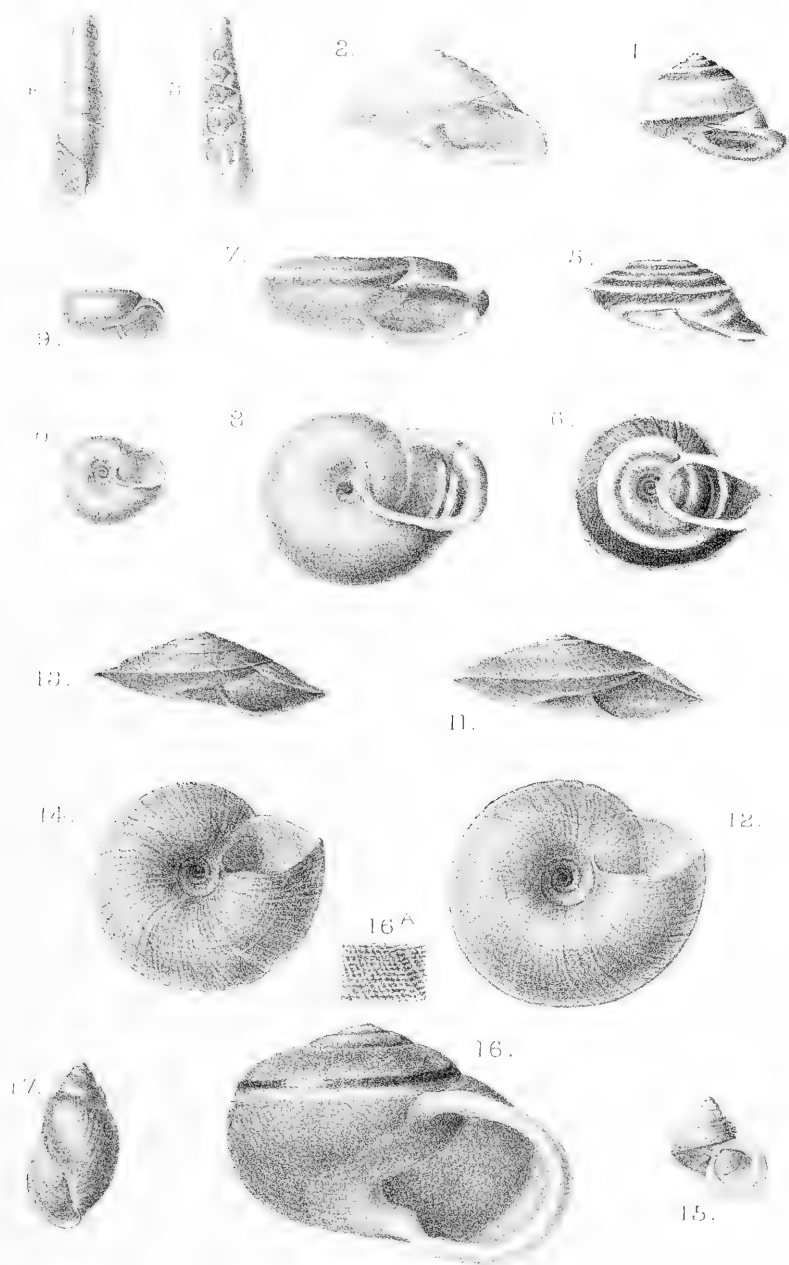
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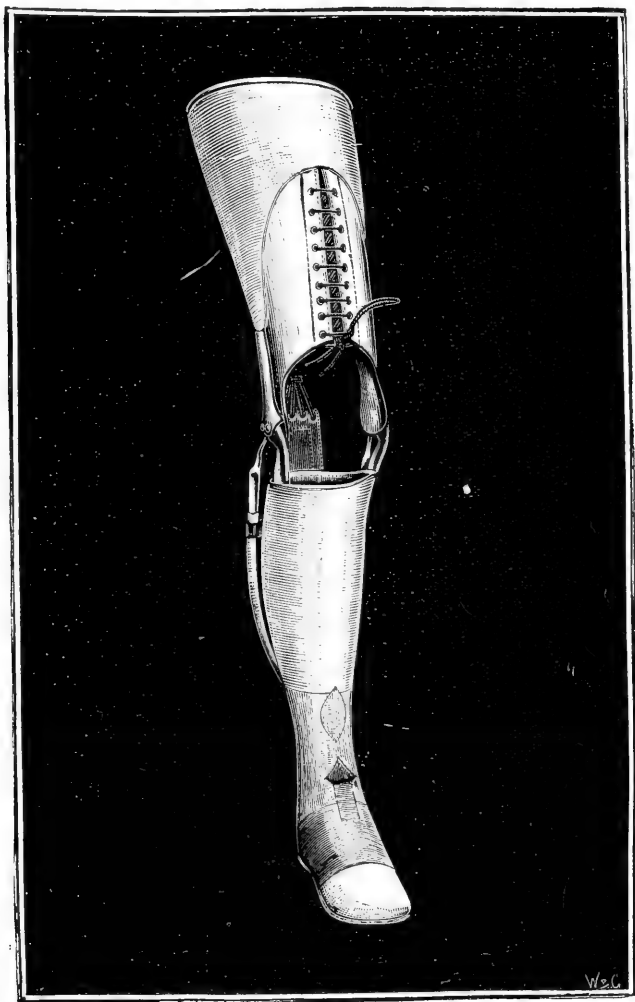
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VOL. X.

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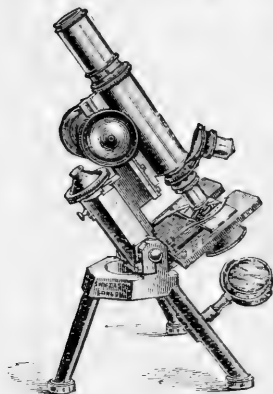
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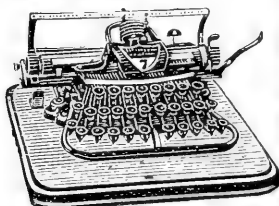
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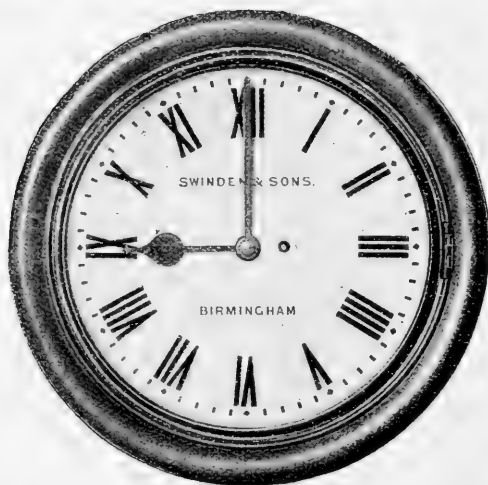
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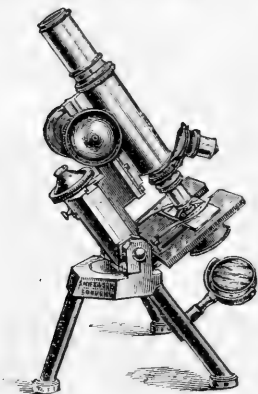
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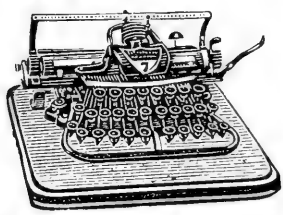
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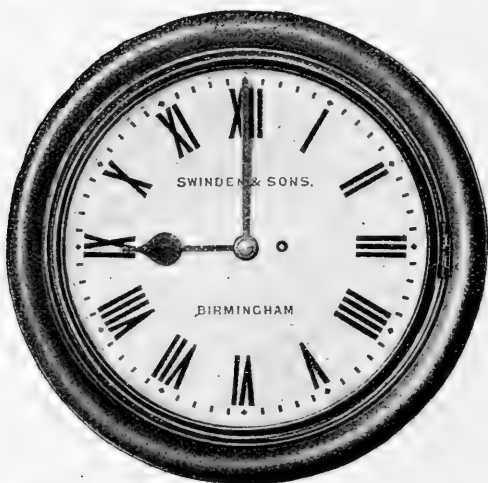
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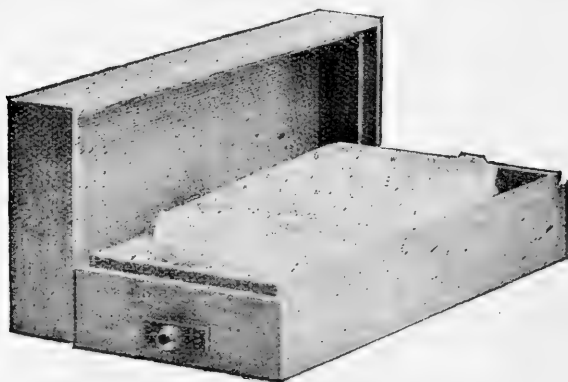
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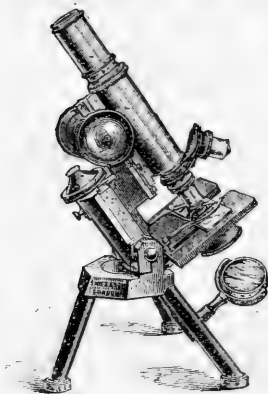
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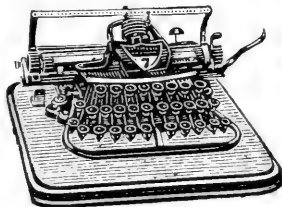
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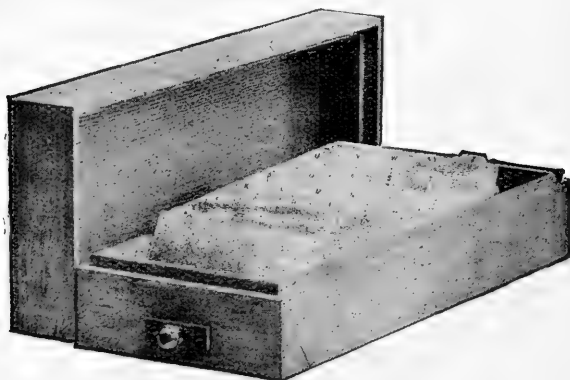
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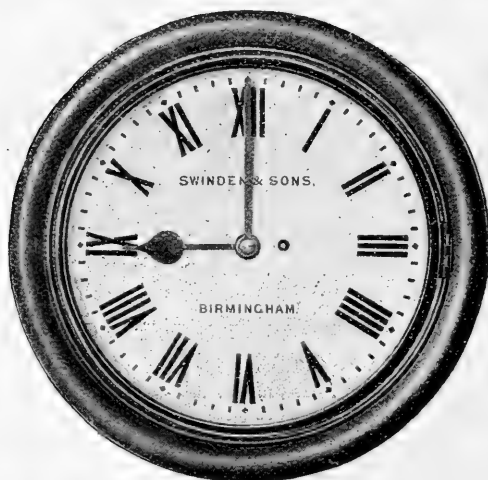
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DECEMBER 21st, 1903.

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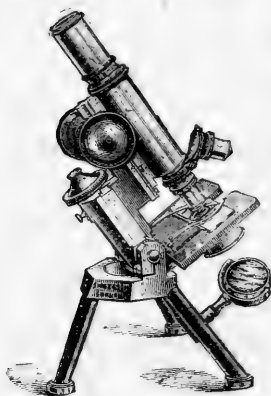
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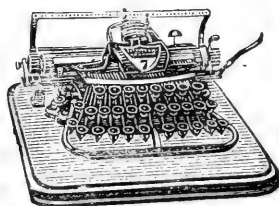
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APRIL, 1904.

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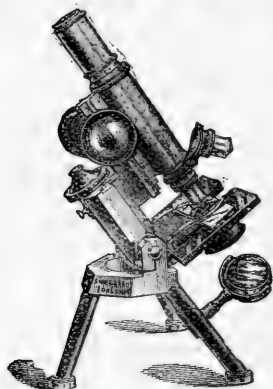
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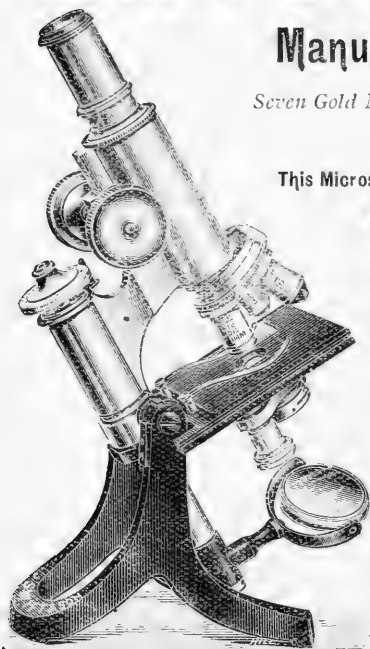
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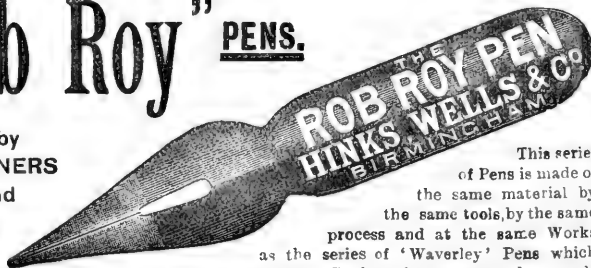
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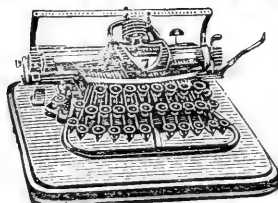
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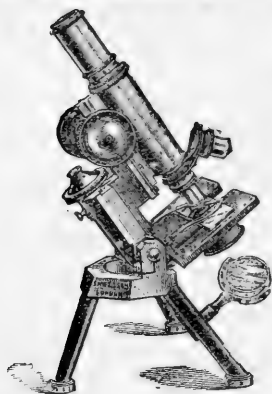
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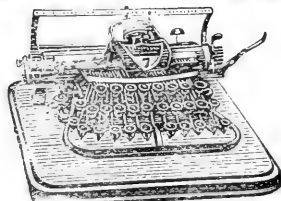
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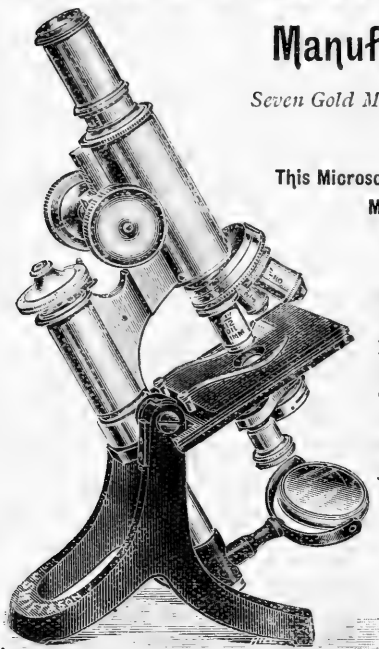
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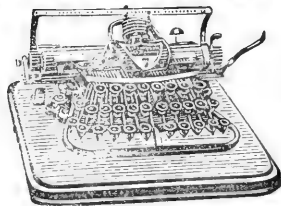
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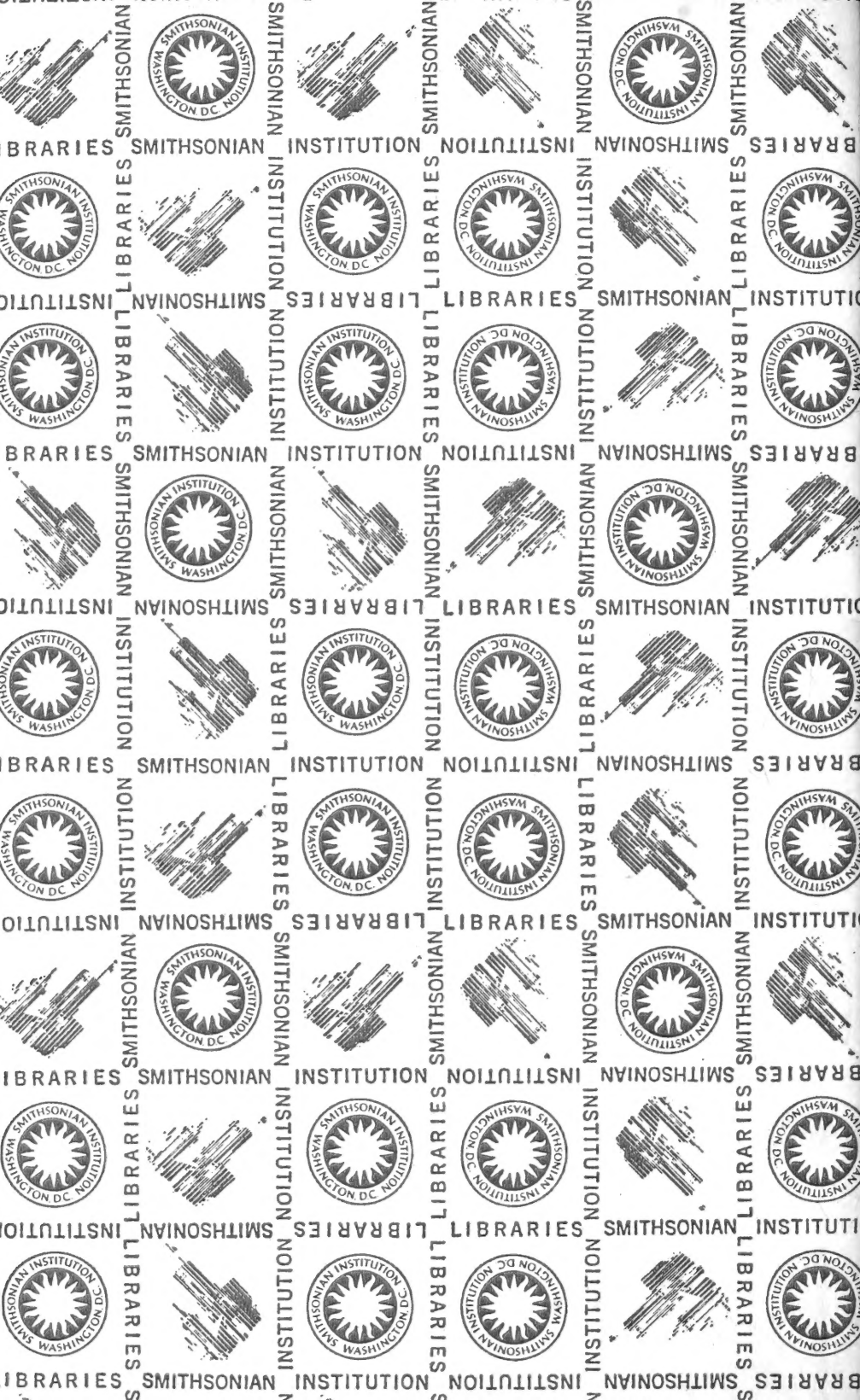
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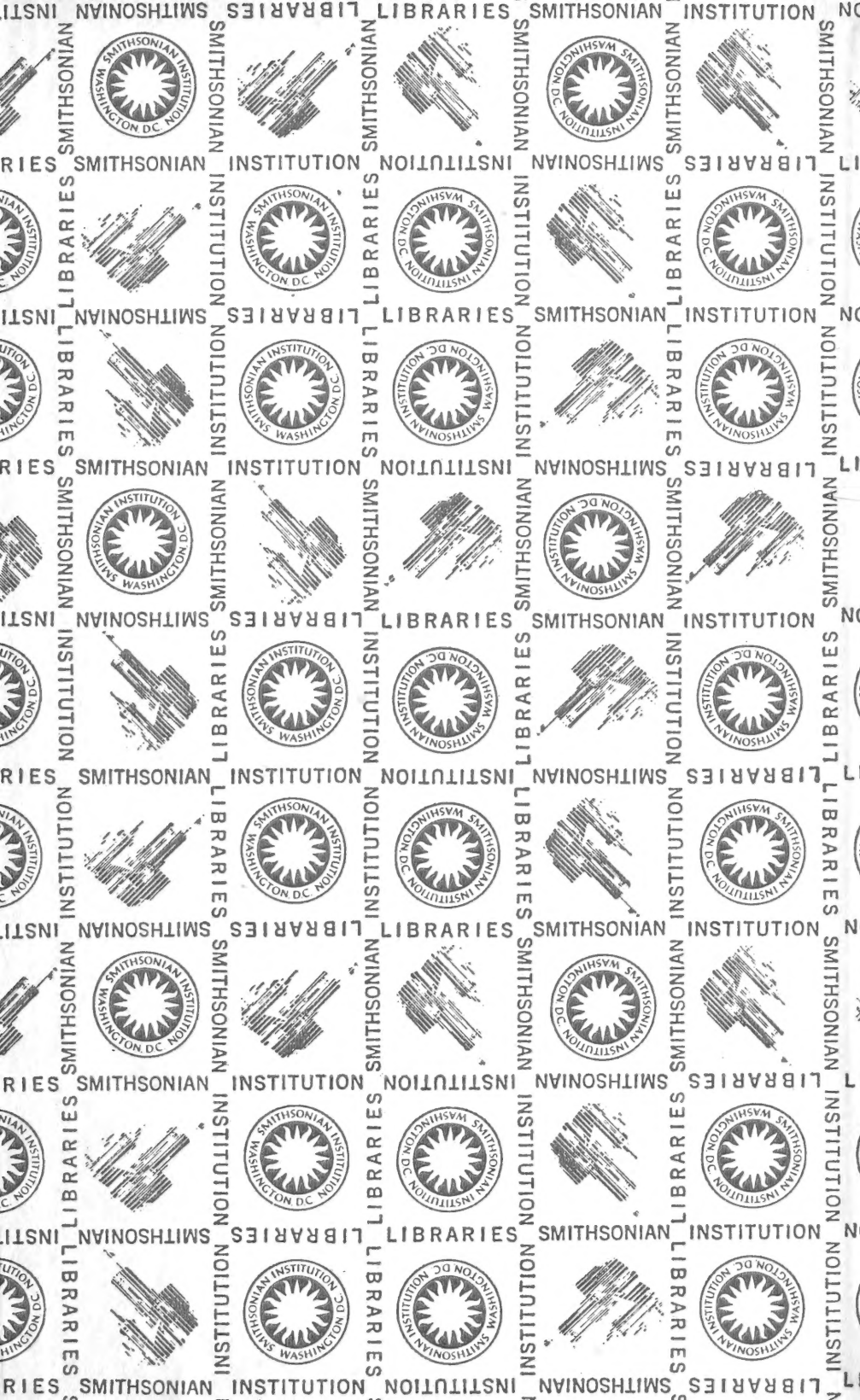
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